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THE
JOURNAL
OF THE
ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE TWENTY-SEVENTH.



910.5
J.R.G.S.

1857.

EDITED BY DR. NORTON SHAW.

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Royal Geographical Society.

1857.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 25TH MAY.

THE Council have much pleasure in submitting to the Members of the Royal Geographical Society the customary Report of its progress since the last Anniversary Meeting.

Members Ordinary, Honorary, and Corresponding.—During the period under review 173 Ordinary members have been added to the list of Fellows—a number considerably exceeding that of any previous year since the establishment of the Society. One Honorary member has also, upon the recommendation of the Council, been elected—Capt. Hartstene, of the United States Navy, lately in command of H.M.S. Resolute; and one Corresponding member, Professor P. A. Munch, of the University of Christiania.

The Society has lost, during the same period, many valuable and eminently distinguished members, including Admiral Beechey, its late President, and the Earl of Ellesmere, his noble predecessor in office; also Baron Hammer-Purgstall, of Vienna, an Honorary and much honoured associate. The Society's lists now comprise 970 Ordinary members, and 58 Honorary and Corresponding members.

Finances.—The audited accounts of the past year, of which a summary is annexed, afford satisfactory evidence of the financial progress of the Society. The receipts, under every head susceptible of increase, exceed the amounts calculated upon; whilst the expenditure has, in each case, been kept within the estimates submitted at the last Anniversary Meeting. Under these favourable circumstances, the Council have directed a farther addition to

be made to the invested funds of the Society. The Permanent Fund now amounts to 3000*l.* New 3 per Cent. Stock. A sum of 500*l.* has also been deposited, at interest, with the Union Bank of London, available for any immediate requirement of the Society.

House.—The inadequacy of the accommodation afforded by the rooms of the Society for the continually increasing number of members and visitors attending its evening Meetings, has for some time engaged the attention of the Council, and several plans suggested have received full and anxious consideration. Active measures are in progress to obtain the great desideratum of a spacious Meeting-room, without the financial disadvantage of a largely-increased expenditure; and it is hoped that before the close of the present Session, the President will be enabled to announce to the Society the completion of so desirable an arrangement.

Publications.—The 26th volume of the Society's Journal, edited by Dr. Shaw, has been some weeks in circulation. It contains many valuable articles and eleven illustrative maps.

The 'Proceedings,' also edited by our Secretary, have now reached the eighth Number, and fully justify the opinion entertained at the outset of this publication, that it would prove most acceptable to Members and to the public generally, as affording¹⁾ early information on subjects of universal interest.

The Committee of Council on Education, the Geographical Society of Darmstadt, the Office of the Geological Survey of India, and the Museum of Natural History of Strasburg have been added to the list of Institutions, to which the publications of the Society are presented.

Map-rooms.—During the past year the maps and charts of the Society have been constantly in requisition for purposes of scientific research. The accessions to this department since the last Anniversary comprise 21 atlases and 6225 maps and charts, and include, among other valuable contributions, the Ordnance Maps of England and Wales, Scotland and Ireland; the Indian Atlas, with maps, charts, and other geographical works, published by the Honourable East India Company; charts published by the Hydrographic Department of the Admiralty, and by the French

Dépôt de la Marine; and maps, plans, and views published by the Statistical Department of the War Office; a map of Russia, in 8 sheets, and an atlas of the Government of Tver, presented by the Imperial Geographical Society of St. Petersburg; Fullarton's Royal Illustrated Atlas; Findlay's Chart of the West Indies and Mexico; Black's Atlas of North America; Dr. Blackie's Atlas; additional sheets of the Government Map of Sardinia; Atlas of the United States, &c., by Prof Rogers and A. Keith Johnston; maps for the Atlas of Bavaria; Atlases of heights, by M. Ziegler; 'Atlas Geographico Estadístico e Histórico de la Republica Mexicana;' Emory's Boundary Map of the United States and Mexico; Wyld's Map of Cuba; Chart of the North Atlantic Ocean, &c., for the telegraphic communication between Great Britain and America; also MS. maps of 'Bahia di todos os Santos,' presented by Mr. E. Porter; and of Southern Africa, by Mr. Moffat, presented through Dr. Livingstone.

Library.—The additions to the books of the Society, by donation and purchase, consist of 700 volumes and pamphlets, among which are Commodore Perry's 'Expedition to the China Seas and Japan;' Crawford's 'Dictionary of the Indian Islands;' 'Le Moniteur des Indes Orientales et Occidentales;' Burton's 'Harrar;' McClure's 'Discovery of the North-West Passage;' Becher's 'Landfall of Columbus;' Monteith's 'Kars and Erzerum;' Fullarton's 'Gazetteer;' Fleming's 'Southern Africa;' Robinson's 'Biblical Researches;' 'Reports of Explorations and Surveys in the United States;' Marcy's 'Red River of Louisiana;' Sitgreave's 'Expedition to the Zuni and Colorado Rivers;' Werne's 'Expedition to discover the Sources of the White Nile;' Andrews' 'Mémorial on the Euphrates Route to India;' 'Annales de l'Observatoire Physique Central de Russie,' presented by the Minister of Finance, St. Petersburg; 'Perceement de l'Isthme de Suez,' by Lesseps; 'Memoirs of the Geological Survey of India;' Armstrong's 'Discovery of the North-west Passage;' Barth's 'Travels and Discoveries in Central Africa, &c.;' Transactions of the Smithsonian Institution of Washington, and of the Imperial Geological Institute of Vienna; the Lombardo-Veneto Institute of Milan; Academies of Science of Paris, Berlin, Munich, St. Petersburg, Madrid; the Publications of the Hakluyt Society,

and of the principal scientific Institutions throughout the world. Connected with the Library and Map-rooms, which have been enriched by his liberal bequest, the Council desire to call attention to the marble bust of our late associate Mr. Greenough, now in the Society's apartments,—a memorial which obtained the unanimous approval of the last General Meeting.

Expeditions.—Various explorations in Africa and Australia have been reported upon and discussed at the evening Meetings of the Society, and will be farther noticed in the President's Address of this day; and attention may be here directed to the Expedition to East Africa under Captain Burton, to whom 750*l.* out of the Government grant of 1000*l.* has been paid. Other expeditions to Borneo, Western Africa, and British North America, now in progress, have likewise been brought before the notice of the Society.

Education.—Our Secretary, Dr. Shaw, has again been called upon to officiate, in conjunction with the Rev. F. Temple and Mr. Merrifield, the Government Inspectors, as Examiner in Geography, by the Lords of the Committee of Privy Council on Education, who have been pleased on the present, as on the former occasions, to return their thanks for his valuable assistance.

Royal Premium.—The Founder's Medal has been awarded to Augustus C. Gregory, Commander of the North Australian Expedition, for his extensive and important explorations in Western and Northern Australia; and the Patron's Medal to Lieut.-Colonel Andrew Scott Waugh, of the Bengal Engineers, Surveyor-General of India, for his geodetical operations, as remarkable for their extent as for their accuracy, whereby widely-extended tracts, hitherto partially or wholly unexplored, have been covered by triangulation of the most accurate order, and geographical data of the highest value have been added to our knowledge of that interesting and important region.

ESTIMATE FOR THE YEAR 1857.

<i>Receipts.</i>		<i>Expenditure.</i>	
	£. s. d.		£. s. d.
Annual Subscriptions	900 0 0	Journal and Proceedings	750 0 0
Life Compositions	400 0 0	Rent, Wages, Lights and Firing	650 0 0
Entrance Fees	300 0 0	Salaries	800 0 0
Arrears of Subscriptions	50 0 0	East Africa Expedition	250 0 0
Sale of Publications	100 0 0	Royal Premium Awards	52 10 0
Royal Premium Grant	52 10 0	Life Compositions' investment	400 0 0
Government Annual Grant	500 0 0	Library and Map Rooms	300 0 0
Dividends on Stock	90 0 0	Office Expenses	250 0 0
Cash Balance, 1st January, 1857	1107 10 0	Sundries for Balance	47 10 0
	£3500 0 0		£3500 0 0

By order of Council.

NORTON SHAW, *Secretary.*

Library Regulations.

I. The Library will be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon, except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week, and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

Exceptions :—

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month ; but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council,

NORTON SHAW, Sec.

ROYAL GEOGRAPHICAL SOCIETY.

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THE QUEEN.

Vice-Patron.

H. R. H. PRINCE ALBERT.

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F E L L O W S.

N.B.—Those having * preceding their names have compounded for life.
Those having † have requested to be placed on the list as abroad.

Year of Election	
1830	Aberdeen, George, Earl of, K.G., K.T., M.A., F.R.S. <i>Argyll-house, Argyll-street; and Haddo-house, Aberdeen.</i>
1855	Acland, Prof. Henry Wentworth, M.D. <i>Oxford.</i>
1853	Acland, Sir Peregrine Palmer F. P., Bart. <i>Fairfield, Somerset.</i>
1830	*Acland, Sir Thomas Dyke, Bart., M.P., F.R.S. <i>Waterloo-hotel, Jermyn-street; and Killerton, Exeter, Devon.</i>
1830	*Ainsworth, William Francis, Esq., F.S.A. <i>Renev-court-villa, New-road, Hammersmith.</i>
1857	Aney, John Moore, Esq. 14, <i>Hulket-street, Grosvenor-place.</i>
1830	*Albemarle, George Thomas, Earl of. <i>Brooks' Club, St. James'; Quiddenham-hall, Larkingford, Norfolk; and Elvedon-hall, Suffolk.</i>
1834	*Alcock, Thomas, Esq., M.P. 95, <i>Park-street; and Kingswood-warren, near Epsom, Surrey.</i>
1838	*Aldam, William, Esq.
1857	10 Aldrich, Commander Robert D., R.N. <i>H.M.S. 'Waterloo,' Sheerness.</i>
1830	Alexander, Lieut.-Col. Sir Jas. Ed., K.L.S., F.R.A.S., etc., 14th Regt. <i>United Service Club, and Fermoy, Ireland.</i>
1857	Alexander, M. Genl., R.A. <i>Blackheath-park.</i>
1855	Alger, John, Esq. <i>Oriental Club, Hanover-square.</i>
1857	Allan, George W., Esq. <i>Toronto, Canada.</i>
1835	*Allen, Capt. Wm., R.N., F.R.S. <i>Athenæum Club; and 5, Oxford-row, Bath.</i>
1854	Ancona, J. S., Esq. 8, <i>John-street, Adelphi.</i>
1856	*Andrew, William P., Esq. 26, <i>Montagu-square.</i>
1853	Ansted, Prof. D. T., M.A., F.R.S., etc. 17, <i>Manchester-street, Manchester-square.</i>
1857	Anstruther, Lt.-Col. Philip, C.B. <i>Maiden Artillery, 1, Chapel-st., Grosvenor-place.</i>
1830	20*Antrobus, Sir Edmund, Bart. 146, <i>Piccadilly; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.</i>
1857	Arbuthnot, Coutts T., Esq. <i>Conservative Club.</i>
1855	*Arden, Richard Edward, Esq. <i>Sinbury-park, Middlesex.</i>
1857	Armstrong, Alexander, Esq., M.D., R.S. 14, <i>Great George-street, Westminster.</i>
1830	*Arrowsmith, John, Esq., F.R.A.S. 10, <i>Soho-square.</i>
1853	*Ashwell, James, Esq., M.A., F.G.S. 17, <i>Manchester-street, Manchester-square.</i>
1856	Ashwell, the Rev. Arthur Rawson, M.A., Principal of Oxf. Dioc. Training College. <i>The College, Cullum, Oxon.</i>
1851	Astley, Francis D. P., Esq., M.R.I. <i>Fellfoot, Newby Bridge, Kental.</i>
1850	*Atkins, John Pelly, Esq., F.S.A. <i>Halsted-house, near Sevenoaks.</i>
1858	Atkinson, Thomas W., Esq. <i>Hock-cottage, Old Brompton.</i>

Year of
Election.

- 1839 30 Attwood, Matthias Wolverley, Esq. 27, *Gravechurch-street*.
- 1832 Auldjo, John, Esq., F.R.S. *Noel-house, Kensington; and Penryhowl, Argyleshire.*
- 1854 Ayrton, Acton, Esq., M.P. 24, *Grafton-street, Bond-street.*
- 1845 *Ayrton, Frederick, Esq. *Egypt.*
- 1857 Aytoun, R. S., Esq. 22, *Berkley-square.*
- 1836 *Back, Rr. Admiral Sir Geo., D.C.L., F.R.S. 109, *Gloucester-place, Portman-square.*
- 1855 Baikie, Wm. Balfour, Esq., M.D., R.N. *Brinswick-cottage, Forton-road, Gosport.*
- 1834 *Bailie, David, Esq., F.R.S. 14, *Balgrave-square; and Hill-park, Surrey.*
- 1857 Baillie, Capt. John, 26th Bengal Native Infantry. 14, *St. James'-square.*
- 1830 *Baily, Arthur, Esq., F.R.A.S. *Harefield, Southampton.*
- 1850 40 Bainbridge, Joseph, Esq. 21, *Hyde-park-gardens.*
- 1857 †Baines, Thomas, Esq. *Liverstone Expedition, and 14, Union-street, Luan Regis.*
- 1830 *Baker, Colonel G. 31, *Grosvenor-place, Bath.*
- 1855 Baker, Lieut. Wm. T., 25th Regt. 31, *Grosvenor-place, Bath.*
- 1853 Balfour, John C. B., Esq. *New South Wales; and Colinton, Moreton Bay.*
- 1847 Balfour, Lieut.-Colonel George, M.A. *East Indies.*
- 1852 Bancroft, Lieut. W. C., 16th Regt. *Aide de Camp and Military Sec., Jamaica.*
- 1840 *Barclay, Arthur Kett, Esq., F.R.S. *Park-street, Borough; and Bury-hill, Iockin, Surrey.*
- 1852 Barclay, David, Esq. *Lastwick-park, Surrey.*
- 1849 Barclay, John, Esq. 7, *Jeffreys-square, St. Mary Axe.*
- 1838 50 Baring, Rt. Hon. Sir Francis T., Bart, M.P., F.R.S. 49, *Latou Square; and Stratton-park, Andover, Hants.*
- 1835 *Baring, John, Esq.
- 1844 *Baring, Thomas, Esq., M.P. 41, *Upper Grosvenor-street.*
- 1853 Bainett, Capt. Edward, R.N. 14, *Woburn-square.*
- 1854 †Barros, Don José Antonio. *Santamarta, New Granada.*
- 1833 Barrow, John, Esq., F.R.S., F.S.A. 7, *New-street, Spring-gardens.*
- 1856 Barth, Heinrich, Esq., PH. DR. 39, *Alphat-road, St. John's-wood.*
- 1857 Bartholomew, John, Junr., Esq. 59, *Fork-place, Edinburgh.*
- 1835 *Bateman, James, Esq., F.R.S., L.S. *Knyppersley-hall, Staffordshire.*
- 1852 *Bates, Joshua, Esq. 21, *Arlington-street, Piccadilly; and East Sheen, Surrey.*
- 1858 60 Baxendale, Joseph H., Esq. 14, *Chester-terrace, Regent's-park; and Scott's-bridge, near Rickmansworth, Herts.*
- 1852 Beadmore, Nathaniel, Esq., C.F. 30, *Great George-street, Westminster.*
- 1857 Beardmore, Septimus, Esq. 28, *Upper Berkeley-street, Hyde-park-square; and Junior United Service Club.*
- 1854 Beaufort, William Morns, Esq., Bengal Civil Service. 11, *Gloucester-place, Portman-square.*
- 1856 Beaumont, John Aug., Esq. *Melrose-hall, Putney-heath; and 56, Regent-street.*
- 1851 *Beaumont, Wentworth B., Esq., M.P. 144, *Piccadilly; Bywell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.*
- 1830 *Becher, Capt. Alex. B., R.N. *Admiralty; and 29, Upper Gloucester-place.*
- 1838 *Beckford, Francis, Esq. *Travellers' Club.*

Year of
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- 1854 Bedford, Commander Edward James, R.N. *Oban, N.B.*
- 1855 Bedingfeld, Commander Norman B., R.N. *Livingstone Expedition; and 15, Surrey-street, Strand.*
- 1845 70 Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. *Mauritius.*
- 1830 *Belcher, Capt. Sir Edward, C.B., F.R.A.S., R.N. *Union Club; and 6, Pelham-villas, Onslow-square, Brompton.*
- 1853 Belcher, Rev. Brymer. *St. Gabriel's, Piccadilly.*
- 1848 Beldam, Joseph, Esq. *Royston, Herts.*
- 1850 *Bell, James, Esq. 1, *Deronshire-place, Portland-place.*
- 1830 *Bell, James Christian C., Esq. 42, *Westbourne-terrace; and 15, Angel-court, Throgmorton-street.*
- 1830 *Bennett, John Joseph, Esq., F.R.S. *British Museum.*
- 1857 Bennett, J. Risdon, Esq., M.D. 15, *Finchbury-square.*
- 1856 *Benson, Robert, Esq. 16, *Craven-hall Gardens, Bayswater.*
- 1856 *Benson, William, Esq., Barrister-at-Law. 6, *Lincoln's-inn; and 6, Sussex-square, Hyde-park.*
- 1830 80 Bentham, George, Esq., F.L.S. 91, *Victoria-street, Westminster.*
- 1856 Berry, Josiah, Esq. 16, *Regent-square.*
- 1842 *Bethune, Rear-Admiral C. R. Drinkwater, C.B.
- 1839 Betts, John, Esq. 115, *Strand.*
- 1845 Biddulph, Robert, Esq. 43, *Charing-cross; 31, Eaton-place; and Ledbury, Herefordshire.*
- 1849 Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square.*
- 1847 *Bird, James, Esq., M.D. 27, *Hyde-park-square.*
- 1858 Bishop, George, Esq., F.R.A.S. 39, *Portland-place.*
- 1839 *Blauw, William H., Esq., M.A., F.S.A., F.Z.S. *Beechlands, near Uckfield, Sussex.*
- 1849 Blackie, W. Graham, Esq., PH. DR. 36, *Frederick-street, Glasgow.*
- 1857 90 Blackstone, Alan C., Esq. *Board of Works, Whitehall-place.*
- 1851 Blackwell, Thomas Evans, Esq., C.E. *Grand Trunk Railway, Montreal, Canada.*
- 1854 Blane, D. Robertson, Esq., Barrister-at-Law. 3, *Paper-buildings, Temple; and 24, Bevington-terrace, Maidstone.*
- 1857 Blake, Wollaston, Esq. 8, *Deronshire-place.*
- 1857 Blakiston, Lieut. Thomas, R.A. *Woolwich.*
- 1830 *Blanshard, Henry, Esq., F.R.A.S. 53, *Chancery-lane.*
- 1857 Blanshard, Richard, Esq. 1, *Somerset-terrace, Warwick-square, Piccadilly.*
- 1854 Blencowe, Robert, Esq. *The Hook, Lanes.*
- 1839 *Blewitt, Octavian, Esq. 73, *Great Russell-street.*
- 1843 *Bliss, Rev. Frederick. *Iwerne Courtney, Blandford.*
- 1852 100 Block, Samuel Richard, Esq. *Green-hill, near Whetstone, Herts.*
- 1857 *Blunt, Joseph, Esq. 13, *Austin Friars; and Mortlake, Surrey.*
- 1851 Bois, Henry, Esq. 110, *Fenchurch-street.*
- 1850 Bollaert, William, Esq., Corr. Mem. University of Chile. 17, *Gracechurch-street; and 14, Brunswick-square.*
- 1858 Bonner, George, Esq. 49, *Pall-mall; and 2, Bayswater-terrace, Kensington-square.*
- 1844 *Borror, Dawson, Esq. *Burton-hall, Henfield, Sussex.*
- 1856 Botherby, Blackett, Esq., M.A. 48, *Brompton-road.*

Year of
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- 1839 *Botfield, Beriah, Esq., M.P., F.R.S., F.S.A., F.R.S.N.A. *Norton-hall, Daventry, Northamptonshire.*
- 1855 Bovet, Charles, Esq. 2, *Cornwall-crescent, Camden Town.*
- 1854 *Bowen, Sir George Ferguson, K.C.M.G., M.A. *Permanent Secretary to the Lord High Commissioner of the Ionian Islands.*
- 1839 110 Bower, George, Esq. 6, *Tokenhouse-yard, City.*
- 1833 Bowles, Admiral William, C.B. 8, *Hill-street, Berkeley-square.*
- 1856 Bowman, John, Esq. 9, *King William-street, City.*
- 1854 †Bowring, Sir John, LL.D., F.R.S.N.A. *Governor and Commander-in-chief, Hong Kong.*
- 1844 *Boyd, Edward Lennox, Esq., F.S.A. 8, *Waterloo-place, Pall-mall.*
- 1856 Boyne, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, &c.*
- 1851 Bracebridge, Charles Rolt, Esq. *Atherstone, Warwick.*
- 1857 Brady, Cheyne, Esq., Barrister-at-Law. 104, *Grafton-street, Dublin.*
- 1857 Bramston, Thomas, W., Esq., M.P. 3, *Clifford-street.*
- 1854 Brand, George, Esq., M.A., F.S.A. 1, *James-st. Adelphi; and Stonehaven, N.B.*
- 1857 120 Brant, James, Esq. *H.M.'s Consul at Damascus, 39, Mark-lane, E.C.*
- 1857 Brasted, Rev. J. B. 3, *Mylne-street, Clarendon-square.*
- 1852 *Breadalbane, John, Marquis of, K.T., F.R.S. 21, *Park-lane; and Taymouth-castle, Aberfeldie.*
- 1845 *Brent, George Smith, Esq. 13, *Caroline-street, Bedford-square.*
- 1846 Brereton, Rev. C. D., M.A. *Little Mussingham, Rougham, Norfolk.*
- 1833 *Brereton, Rev. John, LL.D., F.S.A. *Bedford.*
- 1834 *Breton, William Henry, Esq., Lieut. R.N., M.R.I. *Junior United Service Club; and 15, Camden-place, Bath.*
- 1857 Brett, John Watkins, Esq. 2, *Hunover-square.*
- 1856 Brewer, Rev. John S., M.A., Professor of English Literature. *King's College; and Well Walk, Hampstead.*
- 1858 Bridges, Nathaniel, Esq. 20, *Bedford-square.*
- 1852 130 *Brierly, Oswald Walters, Esq. 8, *Lillington-pl., Harrington-sq., Hampstead-rd.*
- 1857 Brine, Lieut. Bruce, R.E. *Brompton Barracks, Chatham.*
- 1854 Brine, Capt. Frederick, R.E. *Army and Navy Club; and Clarendon, Sidmouth.*
- 1856 Brine, Lieut. Lindesay, R.N. *Clarendon, Sidmouth; and H.M.S. 'Assistance.'*
- 1833 *Brisbane, Gen. Sir Thomas M., Bart., G.C.B., G.C.H., D.C.L., F.R.S., &c. *Makerston, Kelso, Scotland.*
- 1833 *Brodie, Sir Benjamin C., Bart., D.C.L., V.P.R.S., &c., Serjeant Surgeon to the Queen. 14, *Savile-row; and Broome-park, Surrey.*
- 1848 Broke, Captain Sir George N., Bart., R.N. *Broke-hall, Suffolk.*
- 1856 Brook, Captain Wilham, 36th Regt. 6, *Royal-terrace, Ramsgate.*
- 1830 *Brooke, Sir Arthur de Capell, Bart., M.A., F.R.S. *Athenæum Club; and Oakley, near Kettering, Northamptonshire.*
- 1838 Brooke, Sir James, K.C.B., D.C.L. *Rajah of Sarawak, Borneo.*
- 1856 140 *Brooking, George Thomas, Esq. 10, *Connaught-square.*
- 1856 *Brooking, Marmaduke Hart, Esq. 85, *Gloucester-place, Portman-square.*
- 1843 *Brooking, Thomas Holdsworth, Esq. 14, *New Broad-street, City; and 85, Gloucester-place, Portman-square.*

Year of Election.	
1830	Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, <i>Berkeley-square</i> ; and <i>Erle-stoke-park</i> , Wills.
1856	*Brown, Daniel, Esq. <i>The Elms, Larkhall-rise, Clapham.</i>
1837	Brown, John, Esq., F.R.S.N.A. 3, <i>Newcastle-place, Clerkenwell</i> ; and 2, <i>Bloom-field Villas, Tufnel-park West.</i>
1839	*Brown, Robert, Esq., Hon. D.C.L., F.R.S., Memb. Inst. Fr., St. Pet., Berlin, V.P. Linn. Soc., &c. 17, <i>Down-street, Soho.</i>
1856	*Brown, Samuel, Esq. 11, <i>Lombard-st.</i> ; and <i>The Elms, Larkhall-rise, Clapham.</i>
1858	*Brown, Thomas, Esq. 8, <i>Hyde-park-place.</i>
1858	Browne, John H., Esq. <i>Port Geolier, S. Australia.</i>
1858	150 Browne, William J., Esq. 13, <i>Prince's-terrace, Hyde-park.</i>
1852	Browning, Henry, Esq., M.R.I. 72, <i>Grosvenor-street</i> ; and <i>Ampton-hall, Bury St. Edmund's.</i>
1856	*Browning, Thomas, Esq. 6, <i>Whitchall.</i>
1852	*Brunel, Isambard Kingdom, Esq., F.R.S., &c. 18, <i>Duke-street, Westminster.</i>
1856	Bryant, Walter, Esq., F.R.C.S. 7, <i>Bathurst-street, Hyde-park-gardens.</i>
1844	Bryden, William, Esq. 4, <i>New Palace-yard, Westminster.</i>
1842	*Buchan, John H., Esq. <i>Mexico.</i>
1830	*Bullock, Rear-Admiral Frederick. <i>Wolurch.</i>
1839	Bunbury, E. H., Esq., M.A. 15, <i>Jermyn-street.</i>
1837	*Burlington, William, Earl of, LL.D., M.A., F.R.S. 10, <i>Belgrave-square</i> ; and <i>Hudrick-hall, Derbyshire.</i>
1858	160 Barmester, Edward, Esq. <i>Springwell, Clapham-common.</i>
1830	*Burney, Ven. Archd. Charles Parr, D.D., F.R.S., F.S.A. <i>Rectory-house, Bishop's Wickham, Essex.</i>
1857	Burstall, Commander E., R.N. 102, <i>Sloane-street.</i>
1830	*Burton, Alfred, Esq. 36, <i>Marina, St. Leonard's.</i>
1833	*Burton, Decimus, Esq., F.R.S., S.A. 6, <i>Spring-gardens</i> ; and <i>St. Leonard's-cottage, Hastings.</i>
1853	*Buxton, Sir Edward North, Bart., M.P. 10, <i>Upper Grosvenor-street</i> ; and <i>Colne-house, Colmer, Norfolk.</i>
1851	Bynoe, Benjamin, Esq., Surgeon R.N. <i>H.M.S. 'Madagascar,' Rio de Janeiro.</i>
1854	Byron, the Hon. Frederic. 48, <i>Little-place, S. W.</i> ; and <i>Laniford, Maldon, Essex.</i>
1830	*Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, <i>Brick-court, Temple</i> ; 52, <i>Portland-place</i> ; and <i>Aldwick, Sussex.</i>
1857	Caldwell, Capt. Henry, R.N. 3, <i>Andley-square.</i>
1855	170*Calthorpe, the Hon. F. H. Gough. 33, <i>Grosvenor-square.</i>
1854	Calvert, Frederic, Esq., Q.C. 9, <i>St. James's-place</i> ; and 8, <i>New-square, Lincoln's-inn.</i>
1830	*Camden, George Charles, Marquis, K.G., D.C.L., M.A. <i>Wilderness-park, Sevenoaks, Kent</i> ; and <i>Bygham-abbey, Sussex.</i>
1844	*Campbell, James, Esq.
1857	†Campbell, James, Esq., Surgeon, R.N. <i>Bangkok, Siam.</i>
1834	*Campbell, James, Esq., jun., M.R.I. <i>Hampton Court-garden.</i>
1857	Camps, William, Esq., M.D. 40, <i>Park-street, Grosvenor-square.</i>

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- 1853 *Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square*.
- 1857 Carnarvon, Henry Earl of. *Hughclere-castle, near Newbury*.
- 1857 Cartwright, Cornwallis R., Esq. *Walton-on-Thames, Surrey*.
- 1857 180 Cartwright, Colonel Henry, Grenadier Guards. 46, *Park-street, Grosvenor-square*.
- 1830 *Cartwright, Samuel, Esq., F.R.S., F.S.A. 32, *Old Burlington-street; and Nizell's-house, Tombridge*.
- 1857 Cave, Capt. Laurence, Trent. *Army and Navy Club*.
- 1844 *Chadwick, Hugo Mavesyn, Esq. *Nor Hall, near Sutton-Coldfield*.
- 1857 Chalmers, Alexander Thomson, Esq., M.D. *Darventry, Northampton*.
- 1855 Chapman, John, Esq. 124, *Pall Mall; and 2, Leadenhall-street*.
- 1834 *Chapman, Capt. John James, R.A. *Athenæum Club; and Castlem-street, Northampton*.
- 1840 Charters, Major Samuel, R.A. *Athenæum Club; and 3, Bedford-street, James-square, Bath*.
- 1855 Cheshire, Edward, Esq. *Conservative Club, St. James's-street*.
- 1838 *Chesney, Major-General Francis Rawdon, R.A., D.C.L., F.R.S. *Athenæum Club; and Ballyardle, Kikeel, Down, Ireland*.
- 1856 190 Childers, John Walbanke, Esq. *Cantley Hall, near Doncaster*.
- 1857 *Chinmo, Lieut. William, R.N. *H.M.S. "Saracen," Singapore*.
- 1850 Christmas, Rev. H., M.A., D.C.L., F.R.S., F.S.A. 30, *Manor-street, Clapham*.
- 1854 Christy, Henry, Esq. *Woodhines, near Kingston, Surrey*.
- 1854 *Church, John Wm., Esq., B.A. *United University Club; and Woodside, Hatfield*.
- 1830 *Church, W. H., Esq.
- 1849 Churchill, Lord Alfred. 27, *Chapel-street*.
- 1856 Churchill, Charles, Esq. 29, *Sussex-square, Hyde Park*.
- 1856 Claremont, Thomas Lord. *Rensdale-park, Flurry-bridge, Ireland*.
- 1853 Clarendon, George William, Earl of, K.G., G.C.B. 1, *Grosvenor-crescent; The Grove, Watford, Herts; and Houlton, Wilts*.
- 1852 200 Clark, Daniel, Esq. 49, *Milner-square, Islington*.
- 1840 *Clark, Sir James, Bart., M.D., F.R.S. 22 b, *Brook-street*.
- 1851 Clark, Rev. Samuel, M.A. *Principal of the Training College, Battersea*.
- 1830 *Clarke, Sir C. M., Bart., M.D., F.R.S. 68, *Marine Parade, Brighton*.
- 1855 *Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales*.
- 1841 *Clavering, Sir William Aloysius, Bart. *United University Club, Pall-Mall East*.
- 1830 *Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh*.
- 1856 Clive, Rev. Archer. *Whitfield, Hereford*.
- 1854 Clowes, George, Esq. *Stamford-street, Blackfriars; and 57, Russell-square*.
- 1854 Clowes, William, Esq. 31, *Gloucester-terrace, Hyde-park; and Banstead, Surrey*.
- 1852 210 Cobbold, John Chevalier, Esq., M.P. *Athenæum Club; and Ipswich, Suffolk*.
- 1841 *Cocks, Reginald S. T., Esq. 43, *Charing-cross*.
- 1857 Coghlan, Edward, Esq. *Training Institution, Grafty-ann-road*.
- 1838 Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Beetley-square; and Keston, Sussex*.
- 1853 Cole, John Griffith, Esq., M.A., M.B.I. 8, *Charles-street, Berkeley-square*.
- 1841 *Colbrooke, Sir Thomas Edward, Bart., M.P., F.R.A.S. 18, *Port-lane*.

Year of Election	
1834	Colebrooke, Maj.-General Sir Wm., R.A., M.G., C.B., K.H., F.R.A.S. <i>Datchet, near Windsor; and United Service Club.</i>
1854	Coleman, Everard Home, Esq., F.R.A.S. <i>Registry and Record Office, Adelaides-place, London Bridge.</i>
1848	Coles, Charles, jun., Esq. 86, <i>Great Tower-street.</i>
1835	*Collett, William Rickford, Esq.
1855	220 Collinson, Captain Richard, C.B., R.N. <i>Huron-lodge, Ealing; and United Service Club.</i>
1843	*Cook, James, Esq. 40, <i>Mincing-lane; and Brooklands, Blackheath Park.</i>
1856	Cooke, John George, Esq. 2, <i>Upper Grosvenor-street.</i>
1852	Cooke, Robert, Esq. 50, <i>Albemarle-street; and</i> 38, <i>Nottingham-pl., New Road.</i>
1830	Cooley, William Desborough, Esq. 33, <i>King-street, Holborn.</i>
1843	*Cooper, Capt. D. S., 1st Royal Regt. <i>Army and Navy Club.</i>
1856	Cooper, Lt.-Col. Edward, Grenadier Guards. 6, <i>Charles-street, Berkeley-square.</i>
1853	Coote, Charles Chadley, Esq. <i>Mount-Coote, Limerick, Ireland.</i>
1857	Coote, Captain Robert, R.N. <i>Arcoa-lodge, Wicklow.</i>
1853	Copley, Sir Joseph William, Bart. <i>Sprotborough, Doncaster.</i>
1849	230 *Corrance, Frederick, Esq. <i>Parkham-hall, Framlingham, Suffolk.</i>
1856	Costerton, John C., Esq. <i>Canton.</i>
1853	*Co-way, William Halliday, Esq. 32 a, <i>Mount-street.</i>
1857	*Cowell, Lieut. J. C., R.E. <i>Buckingham-palace.</i>
1854	Cowley, Norman, Esq. 4, <i>Montagu-place, Montagu-square.</i>
1854	Cox, Dr. Travers. <i>Fulham.</i>
1853	*Craicroft, Captain Peter, R.N.
1853	Craufurd, Captain Frederic A. B., R.N. <i>Army and Navy Club.</i>
1830	*Craufurd, Captain Henry W., R.N.
1857	Craufurd, Major-General James R. Cabe, Grenadier Guards. <i>Travellers' Club; and Swaney Hall, Chertsey.</i>
1857	240 Crawford, James, Esq. <i>Brussa, Turkey.</i>
1848	Crawford, Robert Wigram, Esq., M.P. 71, <i>Old Broad-street, City.</i>
1830	Crawford, John, Esq., F.R.S. <i>Athenæum Club; and</i> 4, <i>Luton-place West.</i>
1854	*Creswell, Commander Gurney, R.N. <i>Lynn, Norfolk; and H.M.S. 'Surprise.'</i>
1856	Croker, T. F. Dillon, Esq. 6, <i>Strand.</i>
1852	Crowdy, James, Esq. 17, <i>Sergeants'-inn; and</i> 1, <i>Randolph-road, Maida-hill West.</i>
1839	*Cubitt, Sir William, F.R.S., C.E. 19, <i>Great George-street, Westminster; and Clapham-common, Surrey.</i>
1844	*Cubitt, Mr. Alderman William, M.P. <i>Gray's-inn-road; and</i> 21, <i>Abchurch-lane, City.</i>
1855	Cumming, Alex., Esq., M.D., Inspector-Gen. of Hospitals. <i>Army and Navy Club.</i>
1857	Cumming, William F., Esq., M.D. <i>Athenæum Club; and Athol-crescent, Edinburgh.</i>
1846	250 *Cunard, Edward, Esq. <i>New York.</i>
1846	Cunard, Samuel, Esq. <i>Hobbs's Hotel, St. James's-street.</i>
1848	*Cunningham, George Godfrey, Esq. <i>Wooler-mare, Westmorland.</i>
1853	Cunningham, John Wm., Esq., Sec. King's College. <i>Somerset-house; and Harrow</i>
1843	*Cursetjee, Manockjee, Esq., F.R.S.N.A. <i>Tilt-Byoulla, Bombay.</i>
1836	*Curtis, Timothy, Esq.

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- 1857 Dalton, D. F. G., Esq. *Parkstone, near Poole; and Shanks House, near Somerset.*
- 1851 *Daniell, William Freeman, Esq., M.D., F.L.S. 17, *Charles-street, St. James's-sq.*
- 1838 *Darwin, Charles, Esq., M.A., V.P.R.S. *Athenæum Club; and Down, near Bromley, Kent.*
- 1855 Davis, Rev. Nathaniel. *Tunns.*
- 1846 260 Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club; and Hollybrook, near Bristol, Gloucestershire.*
- 1840 *Dawney, the Hon. Payan. *Benningborough-hall, Yorkshire.*
- 1830 *Dawson, Lieut.-Col. R. K., R.E. *Copyhold Enclosure and Tithe Commission, 3, St. James's-square.*
- 1852 De Bonville, Chev. Alexander, K.L.H. 3, *Holland-terrace, Maidstone, Kent.*
- 1856 De Crespigny, Lieut. C. A. C., R.N. 8, *Connaught-place, Hyde-park.*
- 1856 De Gex, William Francis, Esq. 14, *Suffolk-street, Pall Mall.*
- 1835 *De Grey, Thomas Philip, Earl, F.S.A., F.R.A.S. 4, *St. James's-square; Newby-hall, Borough-ridge; and West-park, Silsoe, Beds.*
- 1854 De la Rue, William Frederick, Esq. 108, *Bunhill-row, Chiswell-street.*
- 1834 *Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor-General of Australia.*
- 1836 Denman, Capt. the Hon. Joseph, R.N. 17, *Laton-terrace; and H.M. Yacht.*
- 1833 270 *Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square; and Knowsley-park, Prescott, Lancashire.*
- 1836 De Roos, Rear-Admiral the Hon. J. F. Frederick, F.R.S. 122, *Peccodilly.*
- 1854 *Devaux, Alexander, Esq. 2, *Ateneo-road, Regent's-park.*
- 1844 Dickinson, Major-Gen. Thomas, Bom. Eng., F.R.A.S. *Lower Tulse-hill, Norwich.*
- 1830 *Dickinson, Francis Henry, Esq., F.S.A. 8, *Upper Harley-street; and King-Weston-park, Somerset.*
- 1833 Dickinson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street; and Abbott's-hall, Hemel-Hempstead.*
- 1852 Dickinson, John, Esq., jun. *Clarence Chambers, 12, Haymarket; and Abbott's-hall, Hemel-Hempstead.*
- 1854 *Dickinson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
- 1836 Dick-on, George Frederick. 20, *Hammer-terrace, Regent's-park.*
- 1843 Dickson, Peter, Esq. 28, *Upper Brook-street.*
- 1835 280 *Dilke, Charles Wentworth, Esq. 76, *Stowe-street.*
- 1845 *Dilke, Charles Wentworth, Esq., jun. 76, *Stowe-street.*
- 1856 Dillon, the Hon. Arthur. 17, *Clarges-street.*
- 1840 *Divett, Edward, Esq., M.P. 97, *Laton-square; and Bystock, near Lymouth, Devon.*
- 1854 Dixon, Wm. Hepworth, Esq., F.S.A. *Essex Villa, Queen's-road, St. John's wood.*
- 1857 Dobie, Robert, Esq., M.D., R.N. 7, *Houghton-place, Amptkull-sq., Hampstead-road.*
- 1841 *Dodd, George, Esq., F.S.A. 9, *Grosvenor-place.*
- 1854 Dodson, John George, Esq., M.P. 6, *St. more-place, Park-lane.*
- 1854 *Dolland, George, Esq. *St. Paul's Churchyard.*
- 1854 Domville, William T., Esq., R.N., M.D. *Army and Navy Club.*
- 1836 290 Donaldson, Rev. J. W., D.D., F.R.A.S. *Athenæum Club.*

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- 1853 Donaldson, Stuart, Esq. *Sydney, Australia.*
- 1854 Donkin, Henry, Esq. 6, *Paragon, Kent-road.*
- 1851 Dover, John William, Esq. 124, *Fenchurch-street.*
- 1850 Douglas, Sir George, Bart. *Springwood-park, Roxburghshire.*
- 1854 Dower, John, Esq. 6, *Commey-place, Pentonville.*
- 1853 Doyle, Sir Francis Hastings C., Bart. 12, *Great Cumberland-place, Hyde-park.*
- 1845 *Drach, Solomon Moses, Esq., F.R.A.S. 23, *Wulpole-street, King's-road, Chelsea.*
- 1846 Drummond, Major-General John. *The Boyce, Dymock, Gloucestershire.*
- 1845 Duiry, Capt. Byron, R.N. *Hurroe; and Somerset-cottage, Prior-park, Bath.*
- 1851 305 *Du Cane, Major Francis, R.E. 64, *Loxwodes-square.*
- 1851 *Duce, Henry John, Esq. of, F.R.S. *Spring-park, near Stroud, Gloucestershire.*
- 1857 Dufferin, Frederick Temple, Lord. *Dufferin Lodge, Highgate; and Clundeboyehouse, Belfast.*
- 1840 *Dundas, Right Hon. Sir David, Q.C. 13, *King's-Bench-walk, Temple; and Ochterture, co. Perth.*
- 1830 *Dundas, Rear-Admiral the Hon. Sir Richard Saunders, K.C.B. *Admiralty.*
- 1850 Dunlop, A. Graham, Esq. *Wyndham Club.*
- 1837 *Dunraven, Edwin Richard, Earl of, F.R.S. *Adare-manor, Limerick; and Donarencastle, Glamorganshire.*
- 1856 Duprat, Chevalier Alfredo. *H.M.F. Arbitrator, Cape Town, Cape of Good Hope.*
- 1852 D'Urban, Colonel W. J. *Deputy Quartermaster-General, Canada.*
- 1857 *Dykes, D. Stewart, Esq. *Grove-hill, Surrey.*
- 1857 310 Eardley, E. G. Culling, Esq. *Teston-rectory, Maudstone.*
- 1854 Eardley-Wilmot, Capt. A. P., R.N. *H.M.S. 'Sphinx,' Mediterranean.*
- 1856 Eardley-Wilmot, Lt.-Col. F., R.A. *Director of the Cannon Foundries, Woolwich.*
- 1857 Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park.*
- 1844 *Ebbington, Hugh, Viscount, M.P. 17, *Bruton-street; and Castle-hill, South Molton, Devon.*
- 1853 Egerton, Captain the Hon. Francis, R.N. *Bridgewater-house; and H.M.S. 'Royal Albert.'*
- 1857 Egerton, Commander C. R., R.N. 7, *Butland-gate.*
- 1857 Elder, Rev. Edward, Head-Master. *Charter-house, Charter-house-square.*
- 1845 Ellenborough, Edward, Earl of, G.C.B. 108, *Eaton-square; and Southam-house, near Cheltenham.*
- 1855 Ellesmere, George Granville Francis, Earl of, &c. &c. *Bridgewater-house, Cleckind-square; and Worsley-hall, Lancashire.*
- 1830 320 *Elliott, Rev. Charles Boileau, M.A., F.R.S. 47, *Portland-place; and Tattingstone, Suffolk.*
- 1855 †Elliott, Christopher, Esq., M.D. *Colombo, Ceylon.*
- 1857 Ellis, John Uthly, Esq. *The Birches, Hugley, Stowbridge.*
- 1858 Elphinstone, Captain Howard, R.E. *Topographical Department, War Office, 4, New-street, Spain-palace.*
- 1830 *Elphinstone, the Hon. Mount-Stuart, F.R.A.S., F.R.S.N.A. *Athenæum Club; and Hookwood, Lingfield, Surrey.*
- 1857 Elton, Sir A. H., Bart., M.P. *Athenæum Club.*

Year of Election.	
1830	†Enderby, Charles, Esq., F.R.S., F.L.S. 13, <i>Great St. Helen's</i> .
1856	Entwisle, John, Esq. 1, <i>Russell-square</i> .
1852	Erskine, Rear-Admiral John Elphinstone, C.B. <i>Cardross, Stirling, N. B.</i>
*1857	*Esmearle, G. M. M., Esq. 29, <i>Park-street, Grosvenor-square</i> .
1850	330 Espinasse, Capt. J. W., 12th Regt. <i>Mauritius</i> .
1851	Evans, Rev. Charles. <i>Rugby</i> .
1857	Evans, Frederic J., Esq., R.N. <i>Admiralty; and 4, Wellington-terrace, Chelton, Blackheath</i> .
1830	*Evans, Rear-Admiral George. 1, <i>New-street, Spring-gardens; and Englefield-green, Chertsey</i> .
1857	Evans, Thomas William, Esq., M.P. <i>Allestree Wall, Derby</i> .
1830	*Evans, W. Esq.
1851	*Evelyn, William J., Esq., F.S.A. <i>Ellis's Hotel, St. James's-street; and Wotton-house, near Dorking</i> .
1845	*Everest, Col. Geo., Bengal Art., F.R.S., &c. 10, <i>Westbourne-street, Hyde-park</i> .
1830	*Everett, James, Esq.
1839	Ewer, Walter, Esq., F.R.S., F.L.S. 8, <i>Portland-place</i> .
1856	340 Ewing, J. D. Crum, Esq. 7, <i>Cork-street, Burlington Gardens</i> .
1857	Eyre, Edward J., Esq. 7, <i>Arlington-street</i> .
1856	†Eyre, Lt.-Col. Vincent, C.B. <i>Athenæum Club; and India</i> .
1857	Faddy, Lieut.-Colonel P. P., R.A. <i>Woolwich</i> .
1855	Fagan, Lieut.-Col. C. G. <i>Chilton-bldg, Fulham</i> .
1857	Fairholme, Lieutenant Charles, R.N. <i>H.M.S. 'Megara'</i>
1856	Fairholme, George Knight, Esq. <i>Union Club; and Old Melrose, Melrose, N.B.</i>
1838	Falconer, Thomas, Esq. <i>Ust, Monmouthshire</i> .
1857	Falkland, Lucius Bentinck, Viscount. <i>Stubbers'ciffe, Yorkshire</i> .
1855	*Fanshawe, Capt. E. G., R.N. <i>H.M.S. 'Centurion;' § 27, Rutland-gate, Hyde-park</i> .
1854	350 Farmer, William Francis Gamul, Esq. <i>Nonsuch-park, Surrey</i> .
1857	Farrer, Thomas H., Esq. <i>Board of Trade; and 21, Chester-terrace, Regent's-park</i> .
1853	*Fayrer, John, Esq., M.D. <i>Lucknow; and 15, Surrey-street, Strand</i> .
1838	*Fellows, Sir Charles. 4, <i>Montagu-place, Russell-square; Cowes, Isle of Wight; and Beeston, Nottinghamshire</i> .
1856	Ferguson, Rev. Robert, LL.D., F.S.A. <i>St. Alban's Villa, Ryde, Isle of Wight</i> .
1856	Ferguson, William, Esq. 31, <i>Torington-square</i> .
1840	*Fergusson, James, Esq., F.R.A.S. 20, <i>Lingham-place</i> .
1840	Findlay, Alexander, Esq. 4, <i>Quality-court, Chancery-lane; and Hayes, Kent</i> .
1844	Findlay, Alex. George, Esq. 4, <i>Quality-court, Chancery-lane</i> .
1857	*Fitzclarence, Hon. George, Lieut., R.N. <i>Adlison-road, Kensington</i> .
1830	360*Fittou, Wm. Henry, Esq., M.D., F.R.S., F.L.S. <i>Athenæum Club; and Sussex-gardens, Hyde-park</i> .
1830	Fitz-Roy, Rear-Admiral Robert, F.R.S. <i>Athenæum Club; and 38, Onslow-sq., Brompton</i> .
1853	*Fleming, Rev. Francis, Sec. to Soc. for Promoting Gospel in Foreign Parts. 79, <i>Pall Mall</i> .

Year of Election.	
1857	Fletcher, Thomas K., Esq. <i>Union-dock, Limehouse.</i>
1847	Forrester, Joseph J., Esq., F.S.A. 24, <i>Crutched Friars, City; and Oporto.</i>
1844	Forster, Rev. Charles, B.D. <i>Stisted Rectory, Essex.</i>
1839	*Foister, William Edward, Esq.
1858	Fortescue, Chichester, Esq., M.P. 45, <i>St. James's-place.</i>
1850	*Fowler, Robert N., Esq., M.A. 50, <i>Cornhill; and Tottenham.</i>
1841	*Fowler, Rear-Admiral Robert M. <i>Walliscote-house, Pangbourne.</i>
1830	370*Fox, Lieut.-Gen. Charles R. <i>Travellers' Club; and 1, Addison-road, Kensington.</i>
1854	Fraser, Charles, Esq. 38, <i>Conduit-street.</i>
1830	Fraser, Major-General John, R.E. <i>Deputy Quartermaster-General, Ceylon.</i>
1856	Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, <i>Upper Eccleston-street, Belgrave-sq.</i>
1852	French, Dr. James, C.B. <i>Inspector-General of Hospitals, Graham's Hotel, Edinburgh.</i>
1850	Frere, Bartle J. L., Esq. 45, <i>Bedford-square.</i>
1839	*Frere, George, Esq., jun. 4, <i>Cape of Good Hope; and 45, Bedford-square.</i>
1839	*Frere, Rev. Temple. <i>Clusters, Westminster.</i>
1842	Frere, William Edw., Esq., F.R.A.S. <i>Bombay; and 45, Bedford-square.</i>
1853	Frith, John Griffith, Esq. 13, <i>Wimpole-street; and 11, Austin Friars, City.</i>
1855	380 Fuller, J., Esq. <i>Stevens' Hotel, Bond-street.</i>
1855	*Gabriel, Edmund, Esq. <i>H.M.'s Arbitrator, St. Paul de Loando; and 1, James-street, Adelphi.</i>
1845	*Gage, Admiral Sir William Hall, G.C.H., K.C.B. <i>Arthur's Club; and Thurston Cottage, Bury St. Edmund's, Suffolk.</i>
1855	*Galloway, John James, Esq. <i>Survey Department, Sydney.</i>
1848	*Galton, Capt. Douglas, R.E. 12, <i>Chester-street, Grosvenor-place.</i>
1850	*Galton, Francis, Esq. 42, <i>Rothend-gate, Hyde-park; and 5, Bertie-terrace, Leamington.</i>
1854	*Gammell, Andrew, Esq. <i>Dramtuchty, Kinross-shire, N.B.</i>
1833	Gascoigne, Capt., Ceylon Rifles. <i>Athenium Club.</i>
1858	Gaussen, William, Esq. 12, <i>Montagu-place, Russell-square.</i>
1838	*Gawler, Colonel George, K.H. <i>United Service Club.</i>
1830	390*Gibbes, Charles, Esq. 24, <i>Cornhill-square.</i>
1853	Gifford, George, Earl of, M.P. 2, <i>Wilton-street, Grosvenor-place.</i>
1857	Gilchrist, John, Esq. 48, <i>Rochester-terrace.</i>
1855	Gillespie, Alexander, Esq. 3, <i>Billiter-square, City; and 38, Gordon-square.</i>
1857	Gillespy, Thomas, Esq. <i>Brabant-court, Philpot-lane, City.</i>
1857	Gilmore, Lieut. A. H., R.N. <i>H.M.S. 'Excellent.'</i>
1852	Gisborne, Lionel, Esq., C.E. 6, <i>Duke-street, Adelphi.</i>
1836	Gladish, William, Esq. <i>Bychifes, Gravesend.</i>
1845	*Gladstone, William, Esq. 57½, <i>Old Broad-street, City.</i>
1857	Gleig, Rev. G. R., M.A. <i>Chelsea-hospital.</i>
1854	400 Glen, Joseph, Esq., M.D., Mem. Geogr. Soc. of Bombay. <i>Oriental Club.</i>
1857	Glennie, John Stuart, Esq., F.S.A., Barrister-at-law. <i>Reform Club; and 1, Elm-court, Temple.</i>
1857	Glover, Lieut. John H., R.N. <i>Army and Navy Club.</i>

Year of Election.	
1853	Goderich, George Frederick, Viscount, M.P. 1, <i>Carlton-gardens</i> .
1857	Goldsmid, Aaron A., Esq. 8, <i>Cavendish-square</i> .
1858	Goldsmid, Frederick D., Esq. 59, <i>Harley-street</i> .
• 1830	Goldsmidt, Sir Isaac Lyon, Bart., F.R.S., F.S.A. <i>Park Lodge, Regent's-park; and The Wals, Brighton</i> .
1856	Gordon, Alexander, Esq., C.E. 3, <i>Middle Scotland-yard, Whitehall</i> .
1856	*Gordon, Colonel the Hon. Alexander H., C.B. <i>Argyll-house</i> .
1854	Gordon, Harry George, Esq. 1, <i>Clifton-place, Hyde-park-gardens; and Kilditchassi, Donfield, Perthshire</i> .
1856	410 Gordon, James Wilkinson, Esq. 10, <i>New Palace Yard</i> .
1856	Gordon, Rear-Admiral the Honourable John. 13, <i>Queen Anne-street</i> .
1853	Gordon, Rear-Admiral Robert. <i>United Service Club</i> .
1853	Gore, Montagu, Esq. 20, <i>South Audley-street</i> .
1853	Gore, Richard Thomas, Esq. 6, <i>Queen-square, Bath</i> .
1853	Gorman, John, Esq., M.D. <i>Mark-lane, City; and Hallworth-villa, Tulse-hill</i> .
1835	Gould, Captain Francis A., R.N.
1845	Gould, John, Esq., F.R.S., F.L.S. 20, <i>Broad-street, Golden-square</i> .
1830	*Gowen, James Robert, Esq. 4, <i>Codrington-place, Western-road, Brighton</i> .
1854	*Grace, Rear-Admiral Percy. 60, <i>Green-street, Grosvenor-square</i> .
1833	420 *Graham, the Right Hon. Sir James R. G., Bart., M.P., F.R.S., &c. 46, <i>Grosvenor-place; and Netherby, near Carlisle</i> .
1830	*Gray, John Edw., Esq., Ph.D., F.R.S., V.P.Z.S. and L.S., F.R.S. <i>British Museum</i> .
1830	Greene, Thomas, Esq. 19, <i>Duke-street, Westminster; Slyne, Lancaster; and Whittington-hall, near Barton, Westmoreland</i> .
1857	*Greenfield, W. B., Esq. 2, <i>Parade-street-terrace, North</i> .
• 1857	*Grellet, Henry Robert, Esq. 7, <i>Lloyd-street, Lomb-square</i> .
1853	Griffell, Riversdale W., Esq. 27, <i>Upper Thames-street</i> .
1830	*Gresswell, Rev. Richard, M.A., F.R.S. <i>Worcester College, Oxford</i> .
1852	Greville, Algernon, Esq. <i>Travellers' Club</i> .
1837	*Grey, Sir George, K.C.B. <i>Governor and Commander-in-Chief, Cape of Good Hope</i> .
1844	*Grey, Ralph Wilham, Esq., M.P. 47, <i>Belgrave-square; and Chipchase-castle, Heslam</i> .
1835	430 Griffith, George Richard, Esq. 9, <i>Charles-street, Westbourne-terrace, Hyde-park</i> .
1839	Griffith, John, Esq. 16, <i>Fenchurch-place, South</i> .
1836	Griffith, Richard Clewin, Esq. 10, <i>Gower-street</i> .
1855	Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. <i>Townsend-house, Malvern</i> .
1858	Grote, George, Esq. 12, <i>South-terrace</i> .
1857	Gruneisen, Charles Lewis, Esq. 16, <i>Surrey-street, Strand</i> .
1830	*Gurney, Hudson, Esq., F.R.S., F.S.A., F.R.S.N.A. 9, <i>St. James's-square; and Kesrick-hall, near Norwich</i> .
1857	Gurney Samuel, Esq., M.P. <i>Cushilton, Surrey</i> .
1841	*Haddington, Thomas, Earl of, K.P., F.R.S. 43, <i>Berkeley-square; and Tynning-home-house, Prestonkirk, Huddingtonshire</i> .
1853	*Halkett, Rev. Dunbar S. <i>Little Bookham, Surrey</i> .

Year of
Election.

- 1853 440* Halkett, Lieut. Peter A., R.N. *Wynllham Club.*
- 1853 Hall, Captain William Hutcheson, R.N., F.R.S. *United Service Club; and Shipbourne Lodge, Tunbridge.*
- 1830 Hallam, Henry, Esq., Trust. Brit. Mus., M.A., F.R.S., V.P.S.A., F.R.A.S.; F.R.S.N.A., M. Fr. Inst. 24, *Wilton-crescent; and Pickhurst, Hayes, Kent.*
- 1856 Halloran, Alfred L., Esq., Master R.N. *Coast Guard, Polperra, near Liskeard.*
- 1858 Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Heavitree, Exeter.*
- 1857 Hamilton, Edward, Esq., M.D. 22, *Grafton-street.*
- 1857 Hamilton, Edward Terrick, Esq. 32, *Upper Brook-street.*
- 1830 *Hamilton, Capt. Henry G., R.N. 71, *Eccleston-square.*
- 1830 Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square.*
- 1846 Hamilton, Rear-Admiral W. A. Baillie. *Macartney-house, Blackheath.*
- 1837 450 Hamilton, Wm. John, Esq., F.R.S. 71, *Eccleston-square.*
- 1830 *Hamilton, William R., Esq., Trust. Brit. Mus., F.R.S., F.S.A., &c. 12, *Bolton-row.*
- 1830 Hammersley, Charles, Esq. 25, *Park-crescent, Portland-place.*
- 1858 Hancock, Captain G., R.N. *Sydney-terrace, Ryde, Isle of Wight.*
- 1853 *Hand, Captain George S., R.N. *United Service Club; and H.M.S. 'Sampson.'*
- 1857 Hankey, Thomson, Esq., M.P. 45, *Portland-place.*
- 1837 *Hanmer, Sir John, Bart., M.P., F.R.S. *Hanmer-hall and Bettisfield-park, Flintshire.*
- 1840 *Harcourt, Egerton, Esq. *Athenæum Club; and 5, Carlton-gardens.*
- 1853 Harcourt, Rear-Admiral Octavius Vernon. 29, *Devonshire-place, Portland-place; and Scrimton-park, Bedale, Yorkshire.*
- 1834 *Harding, Major-Gen. George Judd, C.B. *Lieut.-Governor of Guernsey.*
- 1854 460 Hardy, Peter, Esq., F.R.S. 36, *Brunswick-square.*
- 1851 Harrington, Edward J., Esq. 169, *New Bond-street.*
- 1830 *Harriott, Colonel T. G., R. Staff Corps. *Twickenham.*
- 1853 Harris, Captain the Hon. Edw. A. J., R.N. *H.B.M.'s Consul for Chile.*
- 1855 Harris, the Hon. and Rev. C. A. *Rocham's Parsonage, Southampton.*
- 1852 Harris, George Frederick, Esq., M.A. *Harrot-park, Middlesex.*
- 1856 Harrison, George Marsh, Esq. 10, *Lonsdowne-road Villas, Notting-hill.*
- 1847 Harrowby, Dudley, Earl of. 39, *Grosvenor-square; Sandon-house, Lichfield; and Norton, Gloucestershire.*
- 1854 *Hartland, Frederick D., Esq., F.S.A., &c. *The Oaklands, near Cheltenham.*
- 1845 Harvey, W. S., Esq., R.N. *Omnimney and Co., Charing-cross.*
- 1834 470 Hawkins, Bisset, Esq., M.D., F.R.S. 29, *Upper Harley-street; and West Court, Wottonham, Bucks.*
- 1857 Hawkins, Commander Frank K., R.N. *Army and Navy Club.*
- 1840 *Hawkins, John, Esq.
- 1830 Hawtrey, Rev. Dr. Edward Craven, D.D., F.S.A. *Eton College.*
- 1852 *Hay, Capt. J. C. Dalrymple, R.N. 24, *Prince's-gate, Hyde-park, South; and H.M.S. 'Indus.'*
- 1850 *Hay, Robert Wm., Esq., F.R.S., F.S.A., &c. *Blechynden-terrace, Southampton.*
- 1853 Hayward, Robert Newton, Esq. *Porchester-villa, Grange-loan, Edinburgh.*
- 1853 Heath, J. Benjamin, Esq., F.R.S., F.S.A., Consul for Sardinia. 66, *Russell-square.*

Year of
Election.

- 1856 Henderson, Andrew, Esq. 21, *Cambridge-street, Hyde-park-square.*
- 1837 *Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.*
- 1853 480† Henderson, John, Esq. *Valparaiso.*
- 1852 Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens.*
- 1844 *Heneage, Edward, Esq. 14, *Willmott-street, Loundes-square.*
- 1838 *Henry, Wm. Chas., Esq., M.D., F.R.S. *Huffield, near Ledbury, Herefordshire.*
- 1834 *Herbert, Jacob, Esq. *Trinity-house, Tower-hill.*
- 1845 Herbert, Right Hon. Sidney, M.P. 49, *Pelgrave-square; and Wilton-house, Wilts.*
- 1833 *Herbert, Vice-Admiral Sir Thomas, K.C.B. 74, *Cadogan-place; and Tore Cottage, Kilbarney, Iceland.*
- 1858 Herd, Captain D. J. 2, *Norway-house, Lincolncourt.*
- 1858 Hertslett, Edward, Esq. *Librarian, Foreign Office; and Belle Vue-house, Richmond.*
- 1841 Hessey, James Augustus, Esq. *Nightstone, Isle of Wight.*
- 1856 490 Hewitt, James, Esq. *Lecturer in Battersea Training College.*
- 1840 *Heywood, James, Esq., M.P., F.R.S., F.S.A. *Athenæum Club; 5, Eaton-place; and The Hewlands, Prestwich, near Manchester.*
- 1853 Hickey, Edwin, Esq. *Sydney.*
- 1856 Hill, Arthur Bowdler, Esq. *Southfield, Clapham-park.*
- 1857 Hill, Charles C., Esq. *Clapham-park, Surrey.*
- 1854 Hill, Lieut.-Colonel Stephen J. *Army and Navy Club; and Governor and Commander-in-Chief, Sierra Leone.*
- 1858 Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 5, *Stone-buildings, Lincoln's-inn.*
- 1845 *Hindmarsh, Frederick, Esq. 17, *Bucklersbury.*
- 1846 Hobbs, J. S., Esq. 157, *Leadenhall-street, City.*
- 1855 *Hobbs, Wm. Geo. Ed. *Master of Grammar School, Wareside, near Ware.*
- 1830 500 Hobhouse, Henry William, Esq. 28, *South-street, Park-lane.*
- 1834 *Hodgkin, Thomas, Esq., M.D. 35, *Bedford-square.*
- 1857 Hodgson, Kirkman Daniel, Esq., M.P. 8, *St. Helen's-place, Bishopsgate.*
- 1856 Hogg, James, Esq., Jun. 18, *St. Andrew's Square, Edinburgh.*
- 1830 Hogg, John, Esq., M.A., F.R.S., F.L.S., Foreign Sec. R. Soc. of Literature. 8, *Sergeants' Inn, Temple; and Norton-house, Stockton-upon-Tees.*
- 1839 *Holford, R. S., Esq. *Dorchester-house, Park-lane.*
- 1830 Holland, Sir Henry, Bart., M.D., F.R.S. 25, *Lover Brook-street.*
- 1835 *Holmes, James, Esq. 4, *New Ormond-street, Queen-square.*
- 1839 *Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Athenæum Club.*
- 1857 Homfray, Frederick Samuel, Esq. 6, *Cannon-row, Westminster.*
- 1857 510 Homfray, William Henry, Esq. 6, *Cannon-row, Westminster.*
- 1830 *Hooker, Sir Wm. J., K.H., Ph. D., LL.D., F.R.S., F.S.A., &c. *West-park, Kew.*
- 1846 *Hope, Alex. James Beresford, Esq., M.P. 1, *Connaught-place, Hyde-park; and Bedjebury-park, Hurst-green, Kent.*
- 1857 Hoper, R., Esq. 53, *Margaret-street, Cavenish-square.*
- 1857 †Hose, Rev. Henry J., M.A. *Warden of St. Paul's College University, Sydney.*
- 1853 Hoskins, George Alex., Esq. 10, *Gloucester-square, Hyde-park.*
- 1858 Hoste, Capt. Sir William, Bart., R.N. *United Service Club.*
- 1856 Howell, William Hilton, Esq.

Year of Election	
1857	Howard, Samuel Lloyd, Esq. <i>Havering Atte Bower, Romford.</i>
1853	Howard, Sir Ralph, Bart. 17, <i>Belgrave-square</i> ; and <i>Bushy-park, Wicklow.</i>
1842	520*Hubbard, J. Gellibrand, Esq. 24, <i>Prince's-gate, Hyde-park, South.</i>
1857	Hughes, Capt. F. <i>Ely-house, Worcester.</i>
1838	Hughes, William, Esq. 13, <i>Paternoster-row.</i>
1838	*Hume, Edmund Kent, Esq.
1857	Hunt, Zacharias Daniel, Esq. <i>Aylesbury.</i>
1851	Hyde, James Bartlet, Esq. <i>Conservative Club</i> ; and <i>Apley, Ryde, Isle of Wight.</i>
1854	Illl, Benjamin, Esq. 2, <i>Crauen-hill-gardens, Bayswater.</i>
1852	Illingworth, Richard Stonhewer, Esq. 9, <i>Norfolk-crescent, Hyde-park.</i>
1850	*Imray, James, Esq., jun. 102, <i>Minories</i> ; and <i>Minor-park, Streatham.</i>
1851	Inglefield, Captain Edward A., R.N., F.R.S. <i>United Service Club.</i>
1846	530 Ingram, Hughes Francis, Esq. <i>University Club</i> ; and <i>Yotes-court, Mereuorth, Minkstone.</i>
1852	*Inskip, Rev. Robert Mills. 8, <i>Born's-place, Plymouth.</i>
1840	*Ibby, Frederick, Esq. <i>Athenaeum Club.</i>
1853	Iving, Thomas, Esq. 9, <i>Norland-place, Notting-hill.</i>
1850	Jackson, William, Esq. 47, <i>Russell-square.</i>
1855	Jackson, William, Esq., M.P. 9, <i>Bennett-street.</i>
1857	Jefferson, Richard, Esq. <i>Army and Navy Club.</i>
1854	Jellicoe, Charles, Esq. 5, <i>Wimpole-street.</i>
1854	Jenkins, Capt. Griffith, L.S. <i>India.</i>
1840	*Jenkins, R. Castle, Esq.
1853	540 Jenkyn, Rev. Thomas Williams, D.D. <i>Rochester.</i>
1851	Jennings, John, Esq. 20, <i>New Ormond-street, Queen-square.</i>
1854	*Jennings, William, Esq., M.A. 13, <i>Victoria-street, Westminster.</i>
1857	Johnson, Edmund Chas., Esq. 20, <i>Achnagton-street</i> ; and 6, <i>Savile-row.</i>
1854	Johnson, John Hugh, Esq. 4, <i>Stafford-place, Pimlico.</i>
1842	Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., etc. <i>March- hall park</i> ; and 4, <i>St. Andrew-square, Edinburgh.</i>
1856	Johnston, A. R., Esq. <i>Athenaeum Club</i> ; and 25, <i>Mount-street.</i>
1853	Johnstone, Sir John V. B., Bart., M.P., D.C.L. 27, <i>Grosvenor-square</i> ; and <i>Hickness-hall, near Scarborough.</i>
1857	Jones, Capt. Jenkin, Bengal Engineers. <i>Junior United Service Club</i> ; and 1, <i>Leaveland-place, Circus-road, St. John's-road.</i>
1851	Jones, Major-General Sir Harry D., R.E., K.C.B. <i>R. M. College, Farnborough Station, Hants.</i>
1833	550*Jones, William H., Esq., F.H.S. 4, <i>Rupert-street.</i>
1840	*Kalergi, John, Esq. 23, <i>Montagu-square.</i>
1855	†Kare, Major Fred. A. C., 15th Regt. Bombay N. I. <i>Junior United Service Club.</i>
1858	Keane, Edward Arthur, Lord. <i>United Service Club</i> ; and <i>Stetchworth-park, Newmarket.</i>

Year of Election*	
1857	Keating, Henry Singer, Esq., Q.C., M.P. 13, <i>Great Queen-street, Westminster.</i>
1857	Keene, Rev. C. E. Ruck. <i>Sirynscombe-park, Henley-upon-Thames.</i>
1845	*Kellett, Commodore Henry, R.N., C.B. <i>Clonmell, Ireland; and H.M.S. 'Invicta,' Jamaica.</i>
1854	Kennedy, Rev. John, M.A. 4, <i>Stepney-green.</i>
1851	†Kent, John, Esq. <i>Shelfton, Moreton Bay, Australia.</i>
1857	Keysell, Francis P., Esq. <i>Sprynore Villa, 35, Carlton-hill, St. John's-wood.</i>
1846	560 King, Lieut.-Colonel Edward R., 36th Regt. <i>Junior United Service Club.</i>
1857	Kinkel, Gottfried, Esq., Ph.D. 6, <i>Easton-terrace.</i>
1857	*Kinnaird, Hon. Arthur F., M.P. 2, <i>Pall-mall East; and 35, Hyde-park-park.</i>
1858	†Kirk, John, Esq., M.D. <i>Larvinstone Expedition; and Arbroath, Arbroath, Scotland.</i>
1830	Knight, Charles, Esq. 90, <i>Fleet-street; and 8, Carlton-villas, Maiden-lane.</i>
1849	*Laffan, Capt. Robert Michael, R.A. <i>Army and Navy Club; and Otham-lodge, Kent.</i>
1833	*Laid, McGregor, Esq. 3, <i>Mincing-lane; and 2, Charendon-terrace, Brighton.</i>
1838	*Lance, John Henry, Esq., F.R.S. <i>The Holmwood, Dorking.</i>
1856	Langler, J. R., Esq., Lecturer in Wesleyan Normal Institution. <i>Westminster.</i>
1856	Lansdowne, Henry, Marquis of, K.G., D.C.L., F.R.S. <i>Lansdowne-house, Berkeley-square; Bonwood-park, Wex; and Richmond-hall, Surrey.</i>
1833	570*Larcom, Lieut.-Colonel Thomas Askew, R.A., F.R.S. <i>Custom-house, Dublin.</i>
1855	Laroche, William Thomas, Esq. <i>Reform Club; and Wainstead.</i>
1852	Latham, Robert G., Esq., M.D., F.R.S., &c. <i>Greenford-house, Havell, Middlesex.</i>
1854	Latirobe, Charles Joseph, Esq. <i>Athenaeum Club; and The Mote, Timbridge.</i>
1854	Laure, Walter, Esq. 2, <i>Princes-street, Mansion-house.</i>
•1846	*Law, the Hon. Henry Spencer, M.A. 1, <i>Lombes-street; and Ellington-house, Ramsgate.</i>
1830	Law, William J., Esq. 63, <i>Upper Seymour-street; 33, Lincoln's-inn-fields; and 5, Sussex-square, Brighton.</i>
1850	Lawrence, Edward R., Esq. 20, <i>King-street, Portman-square.</i>
1857	Layard, Austin H., Esq., D.C.L. 130, <i>Portland-st.</i>
1830	*Leake, Colonel William M., R.A., LL.D., F.R.S. 50, <i>Queen-Anne-street.</i>
1853	580*Le Breton, Francis, Esq. 21, <i>Sussex-place, Regent's-park.</i>
1856	Lee, Charles, Esq. 41, <i>Grosvenor-place.</i>
1857	Lee, George, Esq. <i>Postmaster-general, Colombo, Ceylon.</i>
1830	*Lee, John, Esq., LL.D., F.R.S., F.S.A., F.R.S.N.A., &c. 5, <i>College, Doctors'-common; and Hartwell-house, near Aylesbury, Bucks.</i>
1839	Lee, Thomas, Esq. 5, <i>Georgie-gard, Lombard-street; and Great Barr, Staffordshire.</i>
1833	*Lefevre, Sir John George Shaw, M.A., F.R.S., Vice-Chancellor of the University of London. 8, <i>Spencer-square.</i>
1853	Lefroy, Charles E., Esq. <i>Erskine-house, Farnham, Surrey.</i>
1853	Lefroy, Lt.-Colonel John Henry, R.A., F.R.S. <i>Pall Mall; and 54, Cambridge-terrace, Hyde-park.</i>
1845	Leigh, John Sturdy, Esq. 7, <i>St. Stephen's-terrace, Westbourne-pore.</i>
1836	Lemon, Sir Charles, Bart., F.R.S., &c. <i>Carcler, near Falmouth, Cornwall.</i>

Year of
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- 1857 592 *Teno, George Wm., Esq. 30, *Bedford-square*; and *Pontypridd, Glamorganshire*.
- 1855 Leslie, George F. Esq. 45, *Ratcliff-gate, Hyde-park*.
- 1810 *Letts, Thomas, Esq. 8, *Royal Exchange*.
- 1857 Leveson, George B. C., Esq. 7, *Lonsdown-terrace, Kensington-park*.
- 1853 Levesque, Peter, Esq., F.S.A. 29, *Guildford-street, Russell-square*.
- 1840 Leven, Edward, Esq. 121, *Gloucester-terrace*.
- 1851 Lyster, Commander Edmund M., R.N. *H.M.S. 'Moulagascar,' Rio Janeiro*.
- 1857 Laidet, Capt. Francis, R.N. *Royal Hospital, Greenwich*.
- 1857 Lindsay, Colonel the Hon. J., Gren. Guards. 20, *Portman-square*.
- 1855 *Lindsay, Wm. S., Esq., M.P. 17, *Portland-place*.
- 1857 6. *Lloyd, George A., Esq. 2, *Royal Lockport-buildings*.
- 1857 Loch, William Adam, Esq. 3, *Warwick-square*.
- 1852 Locke, Joseph, Esq., M.P., F.R.S. 23, *Lombes-st.*; and 13, *Duke-st., Westminster*.
- 1856 *Logan, Sir William Edmond, F.R.S. *Montreal, Canada*.
- 1855 Logan, Sir John S., E. I. C. Service. *Rockampton*.
- 1850 Londborough, Albert, Lord, F.R.S., F.S.A. 8, *Carlton-house-terrace*; and *Grimsby, Yorkshire*.
- 1840 Long, George, Esq., M.A. 22, *Buckingham-street, Brighton*.
- 1839 *Long, Henry L., Esq. *Travellers' Club*; and *Hampton-lodge, Farnham, Surrey*.
- 1857 *Long, W. Beeston, Esq. 4, *Great Cumberland-place*.
- 1847 Longman, Thomas, Esq. *Puterwaster-roor*; and 8, *Sussex-square, Hyde-park*.
- 1856 610 Lovett, Phillips Cosby, Esq. *Liscombe House, Bucks*.
- 1840 Lowry, Joseph Wilson, Esq. 45, *Robert-street, Hampstead-road*.
- 1840 *Lyell, Sir Charles, M.A., LL.D., F.R.S. 53, *Harley-street, Cavendish-square*.
- 1837 *Lynch, Capt. H. Blossie, C.B., Indian Navy, F.R.A.S. *Athenæum Club*.
- 1840 MacDonnell, John, Esq. 48, *Green-ent-road, St. John's-wood*.
- 1854 McDowell, William, Esq. 28, *Three-needle-street, City*.
- 1851 †McGillivray, John, Esq. *Australia*.
- 1856 McGregor, Alexander, Esq. 23, *Upper Wimpole-street*.
- 1855 McGregor, Duncan, Esq. *Board of Trade*; and *Athenæum Club*.
- 1839 Macintosh, Major-Gen. Alex. Fisher, K.H.
- 1845 622 *Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 8, *Waterloo-place, Pall-mall*; and 13, *Greville-place, Kilburn-priory*.
- 1845 Mackenzie, Right Hon. Holt, F.R.A.S. *Athenæum Club*; and 28, *Wimpole-street*.
- 1840 Mackillop, James, Esq., F.R.A.S. *King's-arms-yard*.
- 1855 Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place*.
- 1852 McLeod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea*.
- 1855 Macleure, Andrew, Esq. 37, *Wilbraud, City*.
- 1855 *McClure, Captain Sir Robert J. Le M., R.N. *H.M.S. 'Esq.'*
- 1855 Macnab, John, Esq. *Stent's-place, Leith Walk, Edinburgh*.
- 1839 McNeil, The Right Hon. Sir John, G.C.B. *Groveton, near Edinburgh*.
- 1856 *Macpherson, Dr. Duncan, M.D. Inspector-General of Hospitals. *Madras*.
- 1845 632 Macqueen, James, Esq. 18, *Kensington-crescent*.
- 1831 *Magrath, Edward, Esq. *Hampstead Heath*.

Year of
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- 1853 Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club*; 152, *Albany-street, Regent's-park*; and *Hedingham-castle, Essex*.
- 1845 *Major, Richard Henry, Esq. *British Museum*.
- 1858 Malby, John Walter, Esq. 8, *Stanton-street, Gray's-inn-road*.
- 1853 *Malby, Thomas, Esq. 8, *Stanton-street, Gray's-inn-road*.
- 1843 *Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle*.
- 1853 *Mallet, Charles, Esq. *Audit Office*; and *Belmont, Hampstead*.
- 1835 *Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Schlegel-hall, Manchester*.
- 1856 Mandeville, J. Henry, Esq., late H.M.'s Minister Plenipotentiary at Buenos Ayres. 11, *Leithold Gate*.
- 1830 640 *Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter*.
- 1856 Manning, Frederick, Esq. *Byron-lodge, Tetburyton*.
- 1830 *Marjoribanks, Edward, Esq. 34, *Wimpole-street*.
- 1854 Markham, Clements Robert, Esq. *Union Club*; and 29, *St. George's-road, Eccleston-square*.
- 1836 *Markham, Edward, Esq. 45, *Welbeck-street, Coventry-square*.
- 1857 Marlborough, George, Duke of. *Blenheim, Woodstock*.
- 1857 *Marsden, Robert C., Esq. 14, *Hamcock-terrace, Regent's-park*.
- 1857 Marsh, Matthew Henry, Esq., M.P. *Orford and Cambridge Club*.
- 1854 Marshall, James Garth, Esq. 37, *South-street, Grosvenor-square*; *Headingley, near Leeds, Yorkshire*; and *Monk Conston, Ambleside*.
- 1857 Marshman, J. C., Esq. 7, *Kensington-place-gardens*.
- 1857 650 Martin, Francis P. B., Esq. 14, *Barton-street*.
- 1830 *Martin, Rev. Joseph William, LL.B. *Kenton, Kent*.
- 1850 Martin, R. Montgomery, Esq. 23, *Gloucester-street, Camden-hill, Kensington*.
- 1830 *Martineau, Joseph, Esq., F.Z.S., F.R.S. *Athenæum Club*; *Basing-park, Alton, Hants*; and *Whitbread's Brewery*.
- 1845 *Matheson, Sir James, Bart., M.P., F.R.S. 13, *Cleveland-rose*; and *Achamy, Bonar-bridge, Sutherlandshire, &c*.
- 1837 *Maughan, Captain P., Indian Navy, F.R.A.S. 37, *Melville-street, Edinburgh*.
- 1855 †May, Daniel John, Esq., R.N. *Niger Expedition*.
- 1838 Melvill, Philip, Esq., F.R.A.S. *East India House*.
- 1854 Melville, Lieut.-Colonel, Military Secretary to the Bombay Government.
- 1830 *Meisner, Francis, Esq., F.S.A.
- 1842 660 *Merivale, Herman, Esq., Under Secretary of State for the Colonies. 26, *Westbourne-terrace*.
- 1854 Methuen, Captain Robert. *Oriental Club*.
- 1853 *Miller, Captain Thomas, R.N. *Army and Navy Club*.
- 1857 Mills, Arthur, Esq., M.P. 34, *Hyde-park-gardens*.
- 1844 Milne, Alexander, Esq., C.B., Commissioner of Woods and Forests. 29, *St. James's-place*.
- 1853 Milnes, Richard Monckton, Esq., M.P. 6, *Upper Brook-street*; *The Hall, Bury*; and *Fryston-hall, Fifebridge, Yorkshire*.
- 1837 *Milton, William Thomas, Viscount, M.P. 4, *Grosvenor-square*; and *Wentworth-house, Rotherham, Yorkshire*.

Year of
Election

- 1851 *Mocatta, Frederick D., Esq. 2, *Woburn-place, Russell-square.*
- 1853 Mocatta, George, Esq. *Sydney.*
- 1858 Moffat, Robert, Esq. *Government Surveyor, Hope Town and Kuruman, Cape of Good Hope.*
- 1853 670 Moffatt, George, Esq., M.P. 103, *Edison-square.*
- 1856 Montagu, Henry Seymour, Esq. *Tenby Lodge, Larkhall-lane, Clapham.*
- 1842 *Montagu, Major Willoughby. *Clapham-common.*
- 1842 *Montague, Thomas, Lord, F.R.S. 7, *Parliament-street, Westminster; and Mount Leadenhall, London.*
- 1830 *Montagu, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Grosvener-gate, Park-lane; and 1, 1st Cliff Lodge, Kensington.*
- 1830 *Montagu, Lieut.-General William, F.R.S. 47, *Gloucester-place, Portman-square; and Oriental Club.*
- 1839 Moody, Lieut.-Colonel R. C., R.F. *Lebachugh.*
- 1857 *Moer, Rev. Allen P., M.A., F.R.S. *8, de Winton-st., Augustine College, Canterbury.*
- 1857 Moore, Captain John, R.N. 88, *St. James's-street.*
- 1857 Moore, Major-General W. G. *United Service Club.*
- 1854 645 Moore, Major J. A., F.R.S. 19, *Portland-place.*
- 1853 Moorsom, Captain William, R.N. *Army and Navy Club; and H.M.S. 'Diadem.'*
- 1830 *Morrison, James, Esq. 57, *Upper Harley-street.*
- 1830 *Mornay, Aristides Franklin, Esq., F.R.S. *Pernambuco, Brazil.*
- 1839 *Morns, Charles, Esq. *University Club.*
- 1835 Muir, Thomas, Esq. 24, *York-terrace, Regent's-park.*
- 1830 *Murchison, Sir Roderick Impey, G.C.S.I.S., M.A., D.C.L., F.R.S., V.P.G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. et Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, and Copenhagen, Corr. Ins. Fr., etc. etc. 16, *Polycare-square.*
- 1830 *Murdock, Thomas W. C., Esq. 8, *Parliament-street, Westminster; and River-bank, Bethnal.*
- 1851 Murray, George, Esq. 5, *Austin Friars.*
- 1851 *Murray, Capt. the Hon. Henry Anthony, R.N. 4D, *Albany-chambers, Piccadilly.*
- 1844 695 *Murray, James, Esq. *Parliament Office.*
- 1830 Murray, John, Esq. 59, *Albion-street; and Newstead, Wimbledon.*
- 1853 Napier, Col. George Thomas Conolly, C.B., Assistant Adjutant-General. *Canada.*
- 1857 Napier, Hon. William 22, *Green-street, Grosvenor-square.*
- 1857 Nares, Francis, Esq. *Attorney at Law.*
- 1857 Nelthorpe, George, Esq. 20, *Gloucester-street, Redgrave-road.*
- 1857 *Nesbitt, Henry, Esq. 8, *Henrietta-street, Coventry, London.*
- 1858 Newman, Thomas Holisworth, Esq. 14, *Abchurch-lane-street.*
- 1857 Nicholson, Sir Charles, Bart., Chancellor of the University, Sydney. 65, *Cornhill.*
- 1845 *Nichol, Rev. Chas. G., Librarian and Prof. of Geography, King's College.
- 1856 720 Nicholson, Capt. Sir Frederick William Fiskine, Bart., R.N. 14, *William-street, Leadenhall-street; and H.M.S. 'Porpoise,' Poole.*
- 1857 *Nichols, C. S. A., Esq., Master-Commander R.N. *The Priory, Plympton, Devon.*

Year of
Election.

- 1857 *Nolloth, Captain M. S., R.N. *United Service Club*; and *Peckham, Surrey*.
- 1854 Norman, Henry, Esq. 11, *Henrietta-street, Cavendish-square*.
- 1856 North, Frederic, Esq., M.P. 3, *Victoria-street, Westminster*; and *Hastings-lodge, Hastings*.
- 1830 *Northumberland, Algernon, Duke of, Vice-Admiral, K.G., F.R.S., F.S.A., F.R.S.N.A., Pres. R.I. *Northumberland-house, Charing-cross*; *Alnwick and Keildon Castles, Northumberland*; *Werrington-park, Cornwall*; *Sion-house, Middlesex*; and *Stawick-park, Yorkshire*.
- 1855 O'Byrne, Robert, Esq. 9, *Adelphi-terrace*.
- 1856 O'Byrne, W. R., Esq. 9, *Adelphi-terrace, Strand*; and *Cranford, Middlesex*.
- 1856 O'Connor, Col. Luke Smyth, C.B., Governor of the Gambia. *United Service Club*.
- 1830 Ogle, Sir Charles, Bart., Admiral of the Fleet. 64, *Laton-place*.
- 1855 710 Oliphant, Laurence, Esq. *Athenæum Club*.
- 1853 Oliveira, Benjamin, Esq., F.R.S. 8, *Upper Hyde-park-street*.
- 1845 *Ommanney, Capt. Erasmus, R.N., F.R.A.S. *H.M.S. 'Brunswick,' West Indies*.
- 1838 *Ommanney, H. M., Esq. *Blackheath*.
- 1856 O'Reilly, Commr. Montagu F., R.N. 4, *Brand-street, Greenwich*; and *H.M.S. 'Lupring.'*
- 1856 Osborn, Capt. Sheiard, R.N., C.B., Officier de Légion d'Honneur. *H.M.S. 'Furious,' and Howick, Lincolnshire*.
- 1853 Osborn, Sir George R., Bart. *Travellers' Club*; and *Chicksand-priory, Beds*.
- 1852 Oswell, William Cotton, Esq. *Burlington Hotel, Cork-street*.
- 1855 Otway, Arthur John, Esq. 18, *Chapel-street, Park-lane*.
- 1854 †Ouchterlony, James, Esq. *Mulras*.
- 1844 720 *Overstone, Samuel, Lord, M.A., M.R.I. 2, *Carlton-gardens*; and *Wickham-park, Surrey*.
- 1854 Oxenham, Rev. William, M.A. *Harrow, Middlesex*.
- 1846 *Oxford, Samuel Wilberforce, Bishop of, F.R.S., F.S.A. 26, *Pall-mall*; *Cud-desden Palace, Wheatley, Oxfordshire*; and *Luxington, Sussex*.
- 1852 Packman, Fred. W. S., Esq., M.D. 12, *Charges-street, Piccadilly*; and *Cupton-hall, Chesterfield, Derbyshire*.
- 1853 Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, *Eaton-square*; and *Westwood-park, Droitwich, Worcestershire*.
- 1856 †Palliser, Captain John. *British North American Expedition*; and *Comrah, Kilmackthomas, Waterford*.
- 1855 Palmer, Capt. Edm., R.A. 3, *Wellington-terrace, Charlton, Blackheath*; and *India*.
- 1838 *Palmer, Samuel, Esq.
- 1851 Palmerston, Henry John, Lord Viscount, M.P., K.G., G.C.B., F.R.S., &c. *Cambridge-house, Piccadilly*; and *Broulands, Romsey, Hants*.
- 1849 *Parish, Commr. John E., R.N. *Army and Navy Club*.
- 1833 730 *Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonard's-on-Sea*.
- 1852 Parker, J. Walter, Esq., jun. 445, *West Strand*.
- 1830 *Parker, Thomas Lister, Esq., F.R.S., F.S.A. *Tabley-house, Knutsford*.
- 1850 †Parkes, Harry S., Esq. *Oriental Club*; and *H.B.M.'s Consul at Amoy, China*.

Year of
Election.

- 1850 *Parkyns, Mansfield, Esq., F.Z.S. *Arthur's Club, St. James's-street; and Woodborough-hall, Southwell.*
- 1854 Parr, Thomas Clements, Esq., M.A. 21, *West-mall, Clifton.*
- 1830 *Pasley, Sir Charles William, K.C.B., R.E., F.R.S., Lieut.-Gen. 12, *Norfolk-crescent, High-park.*
- 1857 Paton, A. A., Esq. 37, *Manchester-street, Manchester-square.*
- 1854 Paulson, Commander John T., R.N. *Army and Navy Club.*
- 1847 *Paynter, William, Esq., F.R.A.S. 21, *Belgrave-square; and Camborne-house, Richmond, Surrey.*
- 1855 740 Peabody, George, Esq. 22, *Old Broad-street, City.*
- 1853 Peacock, George, Esq. *Sturcross, near Ely.*
- 1853 *Peckover, Alexander, Esq. *Walsby.*
- 1852 Peel, Capt. Sir William, R.N., K.C.B. *Inch; and Whitehall-gardens.*
- 1846 *Pelly, Sir John Henry, Bart. *Upton, Essex.*
- 1830 *Penn, Richard, Esq., F.R.S. 3, *Lincoln-place, Richmond.*
- 1853 Percy, Colonel the Hon. Hugh M. (Guards). 8, *Portman-square.*
- 1846 Petermann, Augustus, Esq., Hon. Memb. Berl. Geog. Soc.
- 1857 *Peters, William, Esq. 35, *Nichols-lane, Lombard-street.*
- 1854 Phelps, William, Esq. 27, *Montpelier-place, Russell-square.*
- 1843 750 Phillimore, John George, Esq., Q.C. 19, *Old-square, Lincoln's-inn; and 21, Chester-square.*
- 1857 Phillimore, Capt. Augustus, R.N. *Shaplin House, Reading.*
- 1830 *Phillipps, Sir Thomas, Bart., M.A., F.R.S., F.S.A. *Athenaion Club; and Mable-hall, Broadway, Worcestershire.*
- 1856 Phillips, John, Esq., Solicitor. *Histories.*
- 1854 Phillips, Major-General B. Trivell. *South United Service Club.*
- 1854 Phillips, T. Bacon, Esq. 36, *Leicester-place, Brighton.*
- 1852 Pike, Lieut.-Col. John W., R.N. 20, *Parliament-street; Junior United Service Club; and H.M.S. 'Anchitell,' West Coast of Africa.*
- 1855 Pilkington, James, Esq., M.P. *Life in China, and Birmingham.*
- 1851 *Pim, Lieut. Bedford C. T., R.N. 22, *Deodar-square, North-street; and China.*
- 1856 *Plowes, John Henry, Esq. 39, *Forster-lane, Leaden-hall.*
- 1834 750 *Pocock, John I., Esq. 19, *Chatter-box-lane, Leaden-square; and Puckrup-hall, Leicestershire.*
- 1855 *Pollexfen, Capt. J. J. 14, *St. James's-square; and Union-place, Bridge of Aylesbury.*
- 1836 *Pollington, John Charles George, Viscount, F.R.A.S. *Musley-park, near Leeds.*
- 1853 Pollock, Lieut.-General Sir George, Bart. *Clapham-common, Surrey.*
- 1835 *Ponsonby, Hon. Frederick G. B. 1, *Mont-street, Grosvenor-square.*
- 1857 Pope, Captain W. A. 14, *St. James's-square.*
- 1853 Porter, Edward, Esq. *Artists' Club; and 6, Sefton-street, Pall-mall.*
- 1855 †Porter, Rev. J. Esq., M.A. *Jesus College.*
- 1830 *Porter, Major-General Joseph L., F.R.S., Pres. G.S. 58, *Queen's-gardens, Hyde-park, W.*
- 1852 †Powell, Lewis, Esq. *Fort Lewis, Mauritius.*

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Election.

- 1854 770† Power, John Arthur, Esq., M.A., B.M. 52, *Burton-crescent*.
- 1854 Power, John, Esq. 25, *Sussex-place, Regent's-park*; and *Parma*.
- 1856 Powys, the Hon. Thos. L. 10, *Grosvenor-place*; and *Ladydon Court, Plymouth*.
- 1847 Pratt, F. T., Esq., D.C.L. 2, *College, Doctors'-commons*.
- 1853 Price, Jas., Esq., M.D., F.R.C.S., &c. *Gloucester-cottage, Efrog-road, Burton*.
- 1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn*.
- 1855 *Pringle, Thomas Young, Esq. 14, *Eaton-square*.
- 1845 Prinsep, Henry T., Esq. *Little Holland-house, Kensington*.
- 1852 Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club*; and *Norndon-house, Willesdon, Middlesex*.
- 1844 Puller, Christopher W., Esq. *Athenæum Club*; and *Fennybury, Ware, Herts.*
- 1857 780 Purcell, Edward, Esq. 14, *Croom's-hall, Greenwich*.
- 1854 *Quin, Rear-Admiral Michael. *Senior U. S. Club*; and 18, *Albion-villas, Albion-road, Islington*.
- 1853 Rae, John, Esq., M.D. *Canada*.
- 1851 *Ramsay, Capt. Wm., R.N., F.R.A.S. *Junior U. S. Club*; and 23, *Ainslie-place, Edinburgh*.
- 1854 Ramsay, Sir James, Bart. *University Club*; and *Bampf-house, Aylth, N.B.*
- 1841 Raper, Henry, Esq., R.N., F.R.A.S. 6, *Prince's-terrace, Prince's-pole, Hyde-park*.
- 1848 Ravenshaw, E. J., Esq., M.R.A.S. 40, *Harley-street, Cavendish-square*.
- 1844 *Rawlinson, Col. Sir Henry C., M.P., K.C.B., D.C.L., F.R.S. *Athenæum Club*; and 21, *Langham-place*.
- 1838 Rawson, Rawson W., Esq., Colonial Secretary. *Cape of Good Hope*.
- 1852 Raymond, Ven. Archdeacon, of Durham. *Athenæum Club*; 17, *Cumberland-street*; and *Durham*.
- 1857 790 Reed, Willham, Esq. *Oak Lodge, Addison-road, Kensington*.
- 1856 Reid, Henry Stewart, Esq.
- 1838 *Reid, Major-Gen. Sir William, R.E., K.C.B. *Governor of Malta*.
- 1857 Reid, L. R., Esq. 122, *Westbourne-terrace*.
- 1830 *Rennie, George, Esq., C.E., F.R.S., Hon. M.R.I.A. 21, *Whitehall-place*; and *Holmwood-hedge, near Dorking, Surrey*.
- 1830 *Rennie, Sir John, C.E., F.R.S., F.S.A. 51, *Spring-gardens*.
- 1834 *Rennie, M. B., Esq., C.E. 21, *Whitehall-place*.
- 1830 *Renouard, Rev. George Cecil, E.D., M.R.A.S. *Sourascombe-rectory, near Dartford*.
- 1830 *Renwick, Lieutenant, R.E.
- 1853 Reynolds, Joseph, Esq. *Club-chambers, Regent-street*.
- 1857 800 Richards, Capt. George H., R.N. *H.M.S. 'Plumper'* and *Torpoint, Cornwall*.
- 1830 *Richardson, Sir John, R.N., M.D., C.B., F.R.S. *Low-capt, Grasmere, Westmoreland*.
- 1830 *Ripon, Frederick John, Earl of, F.R.S. 1, *Culton-gardens*; *Norton, Shropshire*; and *Putney-leath, Surrey*.
- 1830 *Robe, Colonel Fred. Holt, C.B. *United Service Club*; and *Wool-st-common*.
- 1830 *Robinson, Captain Charles G., R.N. 16, *Debnere-ter., Upper Westbourne-ter.*
- 1850 *Robinson, Walter F., Esq., Lieut. R.N. *Junior United Service Club*.

Year of Election	
1855	Robinson, Thos. Fleming, Esq., F.L.S. 4, <i>Grove-park-terrace, Camberwell-grove.</i>
1856	Roche, Antonin, Esq. <i>Educational Institute, Cadogan-gardens.</i>
1830	*Rodd, James Rennell, Esq. 40, <i>Wimpole-street.</i>
1830	*Roget, Peter Mark, Esq., M.D., F.R.S. 18, <i>Upper Bedford-place, Russell-square.</i>
1834	810 *Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, <i>Hyde-park-gardens; and</i> 25, <i>Southampton-buildings, Chancery-lane.</i>
1857	*Rose, Mr. Alderman Wm. A. 63, <i>Upper Thames-street; and Refsons, Crawford.</i>
1830	Ross, Charles, Esq. 60, <i>Portland-place.</i>
1857	Ross, John, Esq., M.A. 2, <i>Brabant-court, Philpot-lane, City.</i>
1843	*Rosse, William, Earl of, M.A., F.R.S. <i>Birrecastle, Parsonstown, King's County, Ireland.</i>
1839	*Rous, Rear-Admiral the Hon. Henry John. 23, <i>Grafton-street, Bond-street.</i>
1856	Rucker, J. Anthony, Esq. <i>Blackheath.</i>
1830	Rumbold, Charles Edmund, Esq., F.S.A. <i>Preston-house, Andover, Hunts.</i>
1830	*Russell, Jesse Watts, Esq., D.C.L., F.R.S. <i>Horn-hall, Staffordshire.</i>
1830	Russell, Lord John, M.P., F.R.S. 32, <i>Chesham-place; Pembroke-lodge, Richmond; Ludborough-house, Devon; and Girt-house, near Cullinbar, N.B.</i>
1857	820 *Ryder, Captain Alfred P., R.N. <i>United Service Club.</i>
1852	Sabine, Major-General Edw., R.A., V.P.R.S., F.R.A.S., &c. &c. 13, <i>Ashley-place, Victoria-street, Westminster; and Woburn.</i>
1857	St. David's, Connop Thirlwall, Bishop of. 1, <i>Reput-street; and Abergelly Palace, Carmarthen.</i>
1847	St. Asaph, Thomas Vowler Short, Bishop of. <i>Palace, St. Asaph, North Wales.</i>
1840	St. Leon, Anthony B., Esq. 40, <i>Lock-hill, Essex; and</i> 22, <i>Baker-st., Portman-sq.</i>
1857	St. Vincent, Edward, Viscount. <i>Motord House, Staffordshire.</i>
1845	*Salomons, Mr. Alderman David, F.R.S. 3, <i>Great Camberland-place, Hyde-park; and Brompton, near Finsbury Wks.</i>
1852	Saunders, Commander T., R.N. <i>H.M.S. 'Chenango' and Green Hill, Barnet.</i>
1848	Scudott, Major-General the Hon. Sir J. Youke, K.C.B. <i>Portsmouth.</i>
1851	Scudott, Lt.-Col. the Hon. W. F., Scots Fusilier Guards. 70, <i>Ternyn-street.</i>
1854	830 Scherer, George, Esq., M.P., M.A. 15, <i>West-st., Spring-patch.</i>
1855	Scott, Rear-Admiral James. <i>United Service Club.</i>
1840	*Scribner, J. E. P., Esq. 20, <i>Beaumont-square; and Rembridge-house, near Andover, Hants.</i>
1830	*Selwick, the Rev. A. Woodward Lecturer, M.A., F.R.S., <i>Athenæum Club; and</i> <i>London.</i>
1858	*Serbell, Charles P., Esq. 20, <i>New-street, Pall-mall.</i>
1858	Seym, Charles, Esq. 11, <i>Chancery-lane, City.</i>
1853	Seward, Henry, Esq. 20, <i>Green Hill, Old Broad-st., City; and Stamford-hill.</i>
1853	Sexton, George, Esq., M.D., F.R.S. 6, <i>Chancery-lane, Kennington-road.</i>
1853	*Seymour, Henry Duff, Esq., M.P. 10, <i>Upper Grosvenor-street; Knoyle-House, Wiltshire; and</i> <i>London.</i>
1855	Seymour, Alfred Sir George, F.R.S., K.C.H. <i>Commodore, Portsmouth.</i>
1858	840 Symonds, George, Esq. 17, <i>Beaumont-street; and</i> 11, <i>Leinster Gardens, Hyde-park.</i>

Year of
Election.

- 1854 *Shadwell, Captain Charles F. A., R.N., C.B. *H.M.S. 'Highflyer,' and Army and Navy Club.*
- 1856 Share, James Masters, Esq., R.N. *Front-street, Tynemouth, Northumberland.*
- 1855 Shaw, William Edward, Esq., R.N. 1, *James-street, Adelphi.*
- 1846 Sheffield, George A. F. C., Earl of. 20, *Portland-pl.; and Sheffield-park, Sussex.*
- 1857 Sheil, Sir Justin, K.C.B. 2, *Chester-square.*
- 1857 Shelburne, Henry, Earl of. *Launceston House, Berkeley-square.*
- 1856 Shepherd, Captain John, Deputy Master of Trinity House. 7, *Mansfield-street, Cavendish-square.*
- 1857 Sherrin, J. S., Esq., F.L.D. *Germanew School, Stow Market.*
- 1856 Shuttleworth, Sir J. P. Kay, Bart. 38, *Gloucester-square; and Garthorp-hall, Burden, Leicestershire.*
- 1852 850 Silk, John Alexander, Esq. 1, *Brunswick-square; and Southwood-lane, Highgate.*
- 1853 Silver, William, Esq., M.A., Barrister-at-Law. *Addison-road, Kensington.*
- 1853 Simmons, Edward R., Esq., Barrister-at-Law. 1, *Sergeants' Inn, Chancery-lane.*
- 1848 Simmon, Colonel John L. A., R.N., C.B. *Junior United Service Club.*
- 1856 Simmons, Nicholas Fenwick, Esq. 5, *Hatcham-terrace, New-cross.*
- 1853 Simpkinson, Lieut. Francis G., R.N. 22, *Arndel-street, Strand.*
- 1855 *Simpson, John, Esq., M.D., R.N. 40, *Charing-cross.*
- 1857 Simpson, Sir George (Governor-in-Chief, Rupert Land). *Leschmi, Canada East.*
- 1857 Smith, Abel, Esq. 39, *Berkeley-square; and Woodhall-park, Ware.*
- 1855 Smith, Rev. Brownrigg, M.A. *Shepherd-lane, Bruton.*
- 1830 860 *Smith, Sir Charles Felix, K.C.B., Lieut.-Gen. 7, *Onslow-square, Brompton; and Penlyffryn, Conway, North Wales.*
- 1835 *Smith, Edward Osborne, Esq., F.S.A., &c. 24a, *Frymston-square.*
- 1853, †Smith, George, Esq. *Pera.*
- 1857 Smith, George R., Esq. 75, *Edon-square; and Tilsden-park, Surrey.*
- 1857 *Smith, Horace, Esq. *Sawmbe-park, Ware, Herts.*
- 1830 *Smith, James, Esq., F.R.S.L. & E. *Athenorum Club; and Jordan-hill, Glasgow.*
- 1835 *Smith, Lieut.-Col. James Webber, 95th Regt. *Royal Barracks, Dublin.*
- 1854 Smith, John, Esq., Memb. Geograph. Soc., Bombay. *Oriental Club.*
- 1853 Smith, John Harrison, Esq. *Beckendon, Kent.*
- 1853 Smith, John Henry, Esq. 16, *Pall Mall; and Purley, Croydon, Surrey.*
- 1838 870 *Smith, Octavius Henry, Esq. *Thomas-hall, Westminster.*
- 1857 Smith, Philip, Esq., Grenadier Guards. 39, *Berkeley-square.*
- 1857 Smith, Rev. R. Carter. *Cheriton Rectory, S.E.*
- 1841 *Smith, Thomas, Esq.
- 1857 Smith, Wm. Gregory, Esq. *Hudson Bay Company, Fenchurch-street.*
- 1837 *Smyth, Captain William, R.N. *Parkstone, near Poole, Dorset.*
- 1830 *Smyth, Rear-Admiral William Henry, K.N.E., D.C.L., F.R.S., V.P.S.A., F.R.A.S., Hon. M.R.I.A., Corr. Inst. Fr., &c. &c. *Athenorum Club; and St. John's-lodge, near Aylesbury, Bucks.*
- 1850 *Smythe, Lieut.-Colonel William J., R.A. 2, *Craig's Court, Charing-cross.*
- 1840 *Somers, Charles, Earl. *Eastnor-castle, Herefordshire; and The Priory, Reigate, Sussex.*

- 1833 Sopwith, Thomas, Esq., C.E., F.R.S. 43, *Cleveland-square, Hyde-park; and Alnwick, Northumberland, Newcastle-on-Tyne.*
- 1844 220 Southey, Lt.-Col. Frederick S., C.B., F.R.A.S. 3, *Portugal-street, Mount-street.*
- 1833 Southey, Henry Sedgwick, Esq., Barrister-at-Law. *Athenæum Club.*
- 1837 *Spencer, Capt. J. H. *Last African Expedition; and Jordan's House, Ilminster, Somerset.*
- 1837 Spencer, H. Donald M., Esq. 42, *Hyde-park-square.*
- 1833 *Spettiswoode, A., Esq. *New-street-square, Fetter-lane.*
- 1833 *Spettiswoode, William, Esq., F.R.S. 12, *James-street, Buckingham-gate.*
- 1837 Spence-Kee, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Putney.*
- 1833 Stanford, Edward, Esq. 6, *Charing-cross.*
- 1833 Standhope, Philip Henry, Earl of, Pres. Soc. of Antiquaries. 3, *Grosvenor-place, Grosvenor-place; and Chering, Seven Oaks, Kent.*
- 1833 Standland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.*
- 1833 893 *Stanley, Edward Henry, Lord, M.P., D.C.L. 23, *Charles-street, St. James's-sq.*
- 1833 Stanley, Edmund Hill, Esq. *Craven Hotel, Strand.*
- 1833 Statham, John Lee, Esq. 19, *Manchester-street, Argyle-square.*
- 1833 *Stanton, Sir George T., Bart., D.C.L., F.R.S., F.S.A. 17, *Deconshire-street, Portland-place; Chylough-house, Gubray; and Leigh-park, Havant, Hants.*
- 1833 Stavely, Thomas, Esq. 20, *Earl's-terrace, Kensington.*
- 1833 Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square.*
- 1833 *Stephen, Sir George.
- 1833 *Stephenson, Robert, Esq., M.P., F.R.S., President Inst. C.E. 24, *Great George-street, Westminster; and 34, Gloucester-square, Hyde-park.*
- 1837 Stephenson, Sir R. Macdonald, C.E. 115, *Gloucester-terrace.*
- 1834 Stevens, Frederic Perkins, Esq. *Melbourne, Australia.*
- 1833 922 Stevens, Henry, Esq., F.S.A. *Vereant-house, Camden-square.*
- 1841 Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street.*
- 1843 *Stokes, Capt. John Lort, R.N. *Senior United Service Club.*
- 1838 Stopford, Capt. James, R.N. 4, *Norfolk-terrace, Hyde-park.*
- 1833 Strutt, George H., Esq., F.R.A.S. *Milford, near Derby.*
- 1833 *Strzelski, Count P. E. de, C.B., F.R.S. 20b, *Sturde-rov.*
- 1834 *Sturge, Thomas, Esq. *Northfleet, Kent.*
- 1833 Stuart, Capt. Charles, F.R.S. *St. Edmund's, Ticoli, Cheltenham.*
- 1833 Statfield, William, Esq. 15, *Leinster-terrace, Westbourne-terrace.*
- 1837 Sullivan, Captain Bartholomew J., R.N., C.B. *Bowl of Trade.*
- 1833 912 Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. *Junior United Service Club; and 1, Mulgrave-place, the Hoe, Plymouth.*
- 1833 *Sutherland, Peter C., Esq., M.D. *Noted.*
- 1833 *Sutherland, Robert, Esq.
- 1837 Swanzy, Andrew, Esq. 38, *Canion-street, City.*
- 1837 *Swatrig, Robert, Esq. 7, *Clement's-lane, Lombard-street; and Chapel-terrace, Kenton.*
- 1833 *Swinhurn, Rear-Admiral Charles H. 18, *Grosvenor-place; and Cupheaton, near Newcastle-upon-Tyne.*

Year of
Election.

- 1851 Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. *Athenæum Club ; and 47, Albemarle-street, Hyde-park.*
- 1852 Synge, Captain Millington H., R.N. *Palomas.*
- 1852 Tagart, Courtenay, Esq. *Reform Club ; and Paris.*
- 1857 *Tait, Robert, Esq. 5, *Queen Anne-street.*
- 1856 920 Taylor, George Cavendish, Esq. *Army and Navy Club.*
- 1854 *Taylor, John Stoptord, Esq., M.D. 23, *Spurgfield, St. Anne-street, Liverpool.*
- 1850 *Taylor, Richard, Esq., F.S.A., F.L.S., &c. *Red Lion-court, Fleet-street.*
- 1857 Teesdale, J. M., Esq. 9, *Norfolk-square, Hyde-park.*
- 1857 Tennant, Professor James. 149, *Stetand.*
- 1855 Tennent, Wm. W. Emerson, Esq. 66, *Warwick-square, Piccad.*
- 1850 *Thatcher, Colonel, L.L.C.
- 1854 Thomas, Henry Harrington, Esq. *Lansdowne-terrace, Bath.*
- 1854 Thomas, James, Esq. *Liddington-park, Amptthill, Beds.*
- 1854 Thompson, William C., Esq. 81, *Cambridge-terrace, Hyde-park.*
- 1848 935 *Thomson, J. Turnbull, Esq. *Chief Surveyor, Otago, New Zealand.*
- 1854 *Thomson, Thomas, Esq., M.D. *Calcutta.*
- 1846 Thornton, Rev. Thomas Cooke, M.A., M.R.I. *Brock-hall, Northamptonshire.*
- 1858 Thorold, Rev. A. W. 16, *Bedford-square.*
- 1854 Thorold, Henry, Esq. 35, *Gloucester-square.*
- 1853 Tilleard, James, Esq. 17, *Scotsdale-terrace, Kensington.*
- 1854 *Tindal, Commr. Chas., R.N. *Branch Bank of England, Burlington-gardens.*
- 1846 *Tindal, Charles John, Esq. *New South Wales.*
- 1839 *Tinne, John A., Esq. *Beverly, Aghurth, near Liverpool.*
- 1839 Tomline, George, Esq., M.P. 1, *Carlton-house-terrace.*
- 1853 945 *Tomline, George Taddy, Esq., F.S.A. 3 H, *Albany ; and Ash, nr. Sandwich, Kent.*
- 1835 *Tooke, Arthur William, Esq., M.A. 39, *Bedford-row ; and Pinner-hill-house, near Watford, Middlesex.*
- 1850 Torrance, John, Esq. 5, *Chester-place, Hyde-park-square.*
- 1846 *Towry, George Edward, Esq. *Oldfield-lodge, East Cotes, Isle of Wight.*
- 1830 *Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.N.A., &c. *Athenæum Club ; Wallington, nr. Newcastle ; and Nettlecombe, Somerset.*
- 1839 Trotter, Rear-Admiral Henry D., F.R.A.S. *Leamington, Warwick.*
- 1840 *Truman, Dr. Matthew. 40, *Norfolk-square, Notting-hill.*
- 1835 *Tuckett, Frederick, Esq. 4, *Mentmore-street, Cavendish-square.*
- 1852 Tudor, Ed. Owen, Esq., F.S.A. 46, *Westbourne-terrace.*
- 1857 Tudor, Henry, Esq. 46, *Westbourne-terrace.*
- 1834 950 *Turnbull, Rev. Thomas Smith, F.R.S. *University Club ; and Blofield, Norfolk.*
- 1840 Twiss, Dr. Travers, D.C.L., F.R.S. 19, *Park-lane.*
- 1857 Twytton, A. W., Esq. *Beaufit Cragby ; and 38, Harley-street.*
- 1854 *Uzilli, Matthew, Esq. *Hanover-lodge, Regent's-park.*
- 1844 *Vacher, George, Esq. 29, *Parliament-street.*

Year of Election.	
1844	*Vane, Lord Harry G., M.P. 1, <i>Grosvenor-place-houses.</i>
1856	Vardon, Major Frank, 25th Madras Infantry. 10, <i>Craven-hill-gardens, Hyde-park; and Mubos.</i>
1857	Vardon, Thomas, Esq. <i>Library, House of Commons, Palace, Westminster.</i>
1856	*Vaughan, James, Esq., F.R.C.S., Bombay Army. <i>Bombay.</i>
1849	Vaux, William S. W., Esq., M.A., F.S.A. <i>British Museum.</i>
1852	965 *Vavasour, Sir Henry M, Bart. <i>Travellers' Club; and Speldington-hall, Yorkshire.</i>
1855	Vavasseur, James, Esq. 2, <i>Crispigny-park, Denmark-hill.</i>
1837	*Verney, Major Sir Harry C., Bart., M.P., F.R.A.S. <i>Travellers' Club; 36, South-street, Grosvenor-square; and Chypton-house, Bucks.</i>
1857	Verney, Charles, Esq. <i>Fort Bois, Dulwich.</i>
1852	Verulam, James Walter, Earl of. <i>Gorkumbury, near St. Alban's; Barry-hill, Surrey; and Messing-hall, Essex.</i>
1830	Vetch, Captain James, R.E., F.R.S. <i>Admiralty.</i>
1830	*Vidal, Rear-Admiral A. T. E. 10, <i>John-street, Adelphi-hill.</i>
1840	Vigne, G. T., Esq. <i>Athenæum Club; and The Oaks, Woodford.</i>
1857	Vincent, John, Esq., Barrister-at-law. 4, <i>Lamb-buildings, Temple.</i>
1838	*Vyvyan, Sir R. Rawlinson, Bart., F.R.S. <i>Trelowarren, Cornwall.</i>
1857	970 Vyvyan, Richard H. S., Esq., F.R.A.S. <i>Conservative Club; and Trewan, St. Colomb, Cornwall.</i>
1846	Wade, Sir Claude Marten. <i>Messrs. Crawford, Colvin, and Co., 71, Old Broad-street.</i>
1852	Wade, Captain Mitchell B. 66, <i>St. John-street, Liverpool.</i>
1853	*Wagstaff, William Raester, Esq., M.D., M.A. <i>Thornton-house, Clapham-road.</i>
1856	Waldegrave, the Hon. Geo. <i>Assis. Librarian House of Commons, 4, Harley-street.</i>
1846	Walker, James, Esq., C.E., F.R.S. 23, <i>Great George-street, Westminster.</i>
1830	Walker, John, Esq., Hydrog. Hon. E.L.C. 9, <i>Castle-street, Holborn.</i>
1856	Walker, Joshua, Esq. 40, <i>Upper Harley-street.</i>
1855	Walker, Captain William Harrison, B.C.S. 103, <i>Gloucester-terrace.</i>
1854	+Wallace, Alfred Russell, Esq. <i>Dulam Archipelago.</i>
1853	980 Walter, Henry Fraser, Esq. <i>Papplerack-hill, near Nottingham.</i>
1840	*Warburton, Henry, Esq., M.A., F.R.S., F.L.S. 45, <i>Cudogan-place, Sloane-street.</i>
1853	*Ward, George, Esq. 35, <i>Bedford-place.</i>
1851	Warre, John Ashley, Esq., M.P., F.R.S. 54, <i>Lowndes-square; and West-cliff, Ramsgate.</i>
1830	Washington, Capt. John, R.N., F.R.S. <i>Hydrographer to the Navy.</i>
1852	Watkins, John, Esq., F.R.C.S., F.S.A. 2, <i>Filcom-square, Aldersgate-street.</i>
1853	Watts, I. King, Esq. <i>St. Dec, Huntingdonshire.</i>
1857	*Waugh, Lt.-Colonel Andrew Scott, Bengal Engineers, Surveyor-General and Superintendent Great Trigonometrical Survey, <i>India.</i>
1858	*Webb, Capt. Sydney. <i>In custody, Truckenham.</i>
1858	Weldenburn, John, Esq., F.R.A.S. <i>Keith-house, Upper Keith, Blacksheils, N.B.</i>
1851	990 Weller, Edward, Esq. 27, <i>Duke-street, Bloomsbury.</i>
1853	*Wellington, Arthur Richard, Duke of, Major-General, D.C.L. <i>Apsley-house; and Stratfieldsaye, Hampshire.</i>

Year of
Election.

- 1857 West, Lieut.-Col. J. Temple. *Benwick Lodge, Ryde, Isle of Wight.*
- 1851 Westmacott, Arthur, Esq. *United Mexican Mining Assoc., 5, Finsbury-circus.*
- 1852 †Westmacott, Lieut.-Col., R.M. *Junior United Service Club.*
- 1839 *Westminster, Richard, Marquis of. 33, *Upper Grosvenor-street; Eaton-hall, Cheshire; and Motcombe-house, Dorsetshire.*
- 1857 Westminster, Richard C. Trench, Dean of. *Deanery, Westminster.*
- 1852 Weston, Alex. Anderson, Esq., M.A. 18, *Rutland-gate, Hyde-park.*
- 1830 *Weyland, John, Esq., F.R.S. *Woolbush-hall, Norfolk.*
- 1837 *Whewell, Rev. William, D.D., F.R.S., F.S.A., Vice-Chancellor, Cambridge. *Athenæum Club; and Lodge, Cambridge.*
- 1853 1000*Whinfield, Edward Wrey, Esq., B.A. *Botington-lodge, Hemel-Hempstead, Herts.*
- 1837 Whinyates, Lieut.-General E. C., R.A., C.B., K.H.
- 1839 *Whishaw, James, Esq., F.S.A. *Reform Club; and 68, Gower-street.*
- 1855 *White, Charles, Esq. 10, *Lanc-st., City; and Burnesfield, near Dartford, Kent.*
- 1856 White, Robert, Esq. *Covey, Isle of Wight.*
- 1852 White, William Foster, Esq. *Treasurer, Bartholomew Hospital.*
- 1857 White, A. D., Esq., M.D. *Tower House, Winchester.*
- 1857 White, Henry, Esq. *Prince's House, Prince's-gate.*
- 1849 Whitmore, George, Esq. 28, *Orford-square.*
- 1857 Willcock, J. W., Esq., Q.C. *Rosestead-moor, St. John's-wood.*
- 1854 1010Wilkinson, Frederick E., Esq. *Forest-hill, Surrey.*
- 1839 *Wilkinson, Sir John Gardner, D.C.L., F.R.S. *Athenæum Club; and 33, York-street, Portman-square.*
- 1853 Williams, Benjamin, Esq., F.S.A. *The Lodge, Hillingdon, Middlesex.*
- 1857 Williams, Edwin, Esq. 137, *Fenchurch-street.*
- 1856 Williams, Henry Jones, Esq. *Club Chambers; and 82, King William-st., City.*
- 1856 Williams, Henry R., Esq. *Board of Trade.*
- 1830 *Williams, Rev. David, D.C.L., F.S.A. *The Warden, New-college, Oxford.*
- 1857 Williams, Major-General Sir William F., of Kars, Bart., K.C.B., M.P., D.C.L. *Army and Navy Club; Devonport-street, Hyde-park; and Woolrich.*
- 1830 *Willch, Charles M., Esq. 25, *Suffolk-street, Pall-mall-east.*
- 1857 Willis, Captain William A., R.N. *Royal Hospital, Greenwich.*
- 1843 1020*Wilson, Sir Belford Hinton. 34, *Mount-street, Grosvenor-square.*
- 1854 *Wilson, Captain Thomas, R.N. *United Service Club.*
- 1854 Wodifield, Robert D., Esq., Inspector-General of Imports and Exports. 24, *Connaught-square.*
- 1845 Wolff, Rev. Joseph, D.D. *Isles Brever, Somerset.*
- 1855 Wood, Captain James, R.N. *Loch Alsh-house, Diagrall, N.B.*
- 1853 Wood, Right Hon. Sir Charles, Bart., G.C.B., M.P. *Admiralty; and Hickleton, Yorkshire.*
- 1857 Woodhead, Captain H. J. Plumridge. 1, *James-street, Adelpi.*
- 1845 Worthington, Rev. James, D.D. 27, *John-street, Bedford-row.*
- 1856 Wortlington, J. Hall, Esq. *Liverpool.*
- 1857 Wortley, Rt. Hon. James Stuart, Q.C., M.P. *Carlton-gardens.*
- 1839 1030*Wylde, James, Esq., M.P. *Charing-cross.*

Year of
Election

1833	Yates, John Ashton, Esq. 33, <i>Brymston-square.</i>
1854	Yeats, John, Esq. <i>Leicester-house, Piccademy.</i>
1830	*Yorke, Colonel Philip J., F.R.S., Pres. Chemical Society. 89, <i>Eaton-place.</i>
1838	*Young, Charles Baring, Esq. 4, <i>Connaught-place-west, Hyde-park.</i>
1830	*Young, George Frederick, Esq. <i>Lancdowne.</i>
1830	*Young, James, Esq.
1853	Young, Thomas, Esq. 14, <i>Eaton-square.</i>
1857	*Young, Capt. Allen. <i>Residence, Travellersham; and Arctic Regions.</i>
1857	Yule, Capt. Henry, Bengal Engineers. <i>India; and 1, New Bank-buildings.</i>

LIST OF PUBLIC INSTITUTIONS. &c., TO WHICH COPIES OF THE "JOURNAL AND PROCEEDINGS" ARE PRESENTED.

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ANTIQUARIES, SOCIETY OF	HUDSON BAY COMPANY'S LIBRARY
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ARTS, SOCIETY OF	SOCIETY OF
ASIATIC SOCIETY (Royal)	LINNEAN SOCIETY
ASTRONOMICAL SOCIETY (Royal)	LITERATURE, ROYAL SOCIETY OF
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lished materials. By Prof. H. D. Rogers, of Boston, U.S., and A. Keith
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..... Sheets 8 and 9. Chiefly Spanish Documents.

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SOUTH AMERICA, Sheets 4, 5, and 6. East Coast, chiefly from the French Surveys. By M. le Baron Roussin, in 1819-20.

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BRAZIL—Bahia de Todos os Santos (MS.). British Consulate, Bahia. 1850.

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The AUTHOR.

..... Plano Topografico y Geologico de la Provincia de Santiago. Hecho por A. Pisani: por orden del Presidente de la R. publica de la Chile, Don Manuel Mont. y publicado por Adan y Carlos Black, Editores de su Magestad Britanica. Elimbargo, 1857.

J. BARTHOLOMEW, Esq., Jun., F.R.G.S.

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THE Atlantic Neptune, published for the use of the Royal Navy. By J. F. W. Des Barres, under the directions of the Admiralty. 2 Vols. Folio. 1780. W. B. WEBSTER, Esq.

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PRESENTATION
OF THE
ROYAL AWARDS

TO

MR. AUGUSTUS C. GREGORY, THE EXPLORER OF NORTH AUSTRALIA ; AND LT.-COLONEL ANDREW SCOTT WAUGH, DIRECTOR OF THE TRIGONOMETRICAL SURVEY OF INDIA.

THE President opened the Meeting by making the following statement of the grounds on which the Council had awarded the Medals :—

The Founder's Gold Medal has been awarded to Mr. Augustus C. Gregory, for his extensive and accurate surveys in Australia, and particularly for his last great and successful exploration of North Australia and his journey thence, or from the Victoria of Stokes to the Colony of New South Wales, as recommended by the Royal Geographical Society, and carried out under the orders of Her Majesty's Government.

When Her Majesty's Government decided that an exploration of North Australia should be made upon the general plan advocated by this Society, and in accordance with the suggestions of our members Stokes and Sturt, they wisely selected so experienced an Australian surveyor as Mr. Gregory to carry out this great and important project. That gentleman was already well known to us by his successful labours in unravelling the condition of the interior of Western Australia, as recorded and mapped in the 18th and 22nd volumes of our Journal. In the first of these journeys (in 1846) he ascertained that the inner part of that colony is generally flat, broken here and there by low hills of granite or other igneous rock, the depressions being usually occupied by salt lakes or marshes, no fresh-water streams having yet been detected. In 1848, Mr. Gregory proceeded from Perth on what was termed "the Settlers' Expedition," or an endeavour to discover a tract of good

land in the latitude of Champion Bay, and, if possible, to penetrate to the Gascoyne river, which falls into the northern part of Shark Bay. Crossing the Moore and Arrowsmith rivers, he ascended the Murchison, for 50 miles towards its source, and found some rich soil on its banks. Determining everywhere his positions astronomically, he proceeded to the affluents of that stream and made ineffectual efforts to force his way through the dense brush or scrub of the waterless, arid plains south of Shark Bay; when the exhaustion of his horses, great heat, and the sterile sandy soil proved to him that the interior of the colony could only be explored in the moist winter months. He therefore returned to Perth, having travelled about 1500 miles without detecting any notable quantity of good land, and having failed in reaching the Gascoyne river, from the want of fresh water and the impenetrable thickets of scrub.

Most of the officers of the last and great expedition, which we had so long advocated, having been sent from England to Sydney, the expedition was there placed under the orders of Mr. Gregory. Being properly fitted out under the directions of our associate Sir William Denison, the Governor of New South Wales, and proceeding thence by sea through Torres Strait and along the north coast of the continent, it reached the great bay, first made known to us by Capt. P. King in 1819, the eastern gulf of which, or Queen Strait, and its stream the Victoria, were explored by Wickham and Stokes in 1839.

Having ascended the Victoria, with the schooner *Tom Tough*, as far as was practicable, Mr. Gregory established a camp on the right bank of this stream, at about 80 miles from its mouth. With his brother, Mr. H. Gregory, Mr. J. S. Wilson the geologist, and Dr. Ferdinand Mueller the botanist, he then explored the Victoria to Jasper Creek, determining the geological nature of the country, and ascertaining that the river made a great southward bend. Again taking with him his brother, and Dr. Mueller, together with the artist, Mr. T. Baines, he marched southwards to ascertain if the saline desert, which Sturt had discovered in proceeding inland from the southern regions of Australia, and which he had himself found to prevail in Western Australia, was also to be met with in a journey southwards from the north coast.

For this purpose he ascended the Victoria to its source, and found the hilly or dividing range to have an altitude of 1660 feet above the sea. Traversing this watershed, he descended by a

stream flowing south, which he named Sturt Creek, and which, bending to the S.S.W., terminates in a desiccated salt lake near Mount Wilson, in S. lat. $20^{\circ} 2'$ and E. long. $127^{\circ} 5'$. Whilst the south-eastern and southern slopes of the dividing range were thus proved to be everywhere dry and sterile sands, the whole of the territory to the north of the same presented the most striking contrast, being generally fertile in grasses, particularly the extensive grounds named Hutt Plains and Roe Downs.

In this first effort, therefore, made specially by the advice of our medallist Sturt, the grand geographical and statistical feature, which was suspected to exist, was brought to the test; and we may now fairly infer, that all the central portion of this continent, as well as the long southern coast line examined by our associate Eyre, and a considerable maritime frontier of Western Australia, constitute an uninhabitable desert, probably the dried-up bottom of a sea, and that hence all future intercourse between our Australian colonies must take place either along the fertile coast ranges, or by sea.

Returning to his camp, which he had left under the charge of Mr. Wilson, who had in the mean time examined the adjacent country, of which he sent home a sketch map to this Society, Mr. Gregory sent away Mr. Baines, with Mr. Wilson, and the larger number of his party, in the schooner; and after giving directions that the vessel should meet him at the head of the Gulf of Carpentaria, he set out on his chief mission, accompanied by his brother, Mr. Elsey the surgeon, Dr. Mueller, and three men.

Quitting the basin of the Victoria, and passing over a broad table-land of sandstone, he entered a valley watered by a tributary of Leichhardt's river, the Roper, which he named Elsey Creek, in S. lat. $15^{\circ} 15'$ and E. long. $133^{\circ} 10'$. He next took a south-south-easterly direction to the west of Leichhardt's route, or about 70 miles distant from the western shore of the Gulf of Carpentaria, and traversed the various rivers discovered by his adventurous precursor (but nearer to their sources) until he reached the Albert, which empties itself into the head of the Gulf. Not meeting there with the party sent by sea, under the orders of Mr. Baines, he left the 'Plains of Promise' of Stokes, and crossed the river Flinders at about 80 miles distance from the Albert, and, journeying to the north-east, fixed a position on the Gilbert River at S. lat. $18^{\circ} 0'$ and E. long. $140^{\circ} 40'$. Ascending that stream, Mr. Gregory left behind the drainage into the Gulf of Carpentaria, and traversed the high basaltic plateau which separates the waters flowing into that gulf, from those which

descend into the great eastern ocean. To the dividing high lands he assigned the name of 'Newcastle Range,' in honour of the Secretary of State for the Colonies, who had sanctioned the expedition. Reaching the Burdekin, he followed that stream south-eastwards to its junction with the Cape river of Leichhardt.*

The next march showed the connection of the Suttor of Leichhardt with the Belyando of Mitchell; then striking south-west from the latter stream, Mr. Gregory skirted the Peak range, the extreme point to which squatters have extended their dwellings, *i. e.* in S. lat. $23^{\circ} 41'$ and E. long. $147^{\circ} 50'$, or about 560 miles from the head of the Gulf of Carpentaria.

Whilst a great breadth of entirely sterile tracts, with only one insulated rich spot on the river Roper, prevails between the basin of the Victoria on the north coast and the Gulf of Carpentaria, with occasional poisonous plants, Mr. Gregory found nearly all the vast region between the eastern side of the gulf and the northernmost station of our settlers, to be more or less fertile. During the last weeks of the expedition the horses fattened, and after traversing the rivers Mackenzie, Comet, Dawson, and Burnett, the party reached the Brisbane and Moreton Bay in excellent health.

The value of the researches of Mr. Gregory and his associates cannot be appreciated until all their records, and the general map, now in course of compilation by Mr. Arrowsmith, shall have been published: although we already know how vastly our acquaintance with the geographical distribution of plants has been enlarged by the collections of Dr. Mueller.† In the mean time, however, the geographers of all countries will admit that we have rightly awarded our Founder's Gold Medal to the successful explorer of such vast unknown lands, through which his united journeys have amounted to upwards of 6500 miles, and in making which he has determined many points of longitude as well as latitude, and has accurately defined the character of a fine basin of North Australia, which may probably, at no distant day, become a British colony.—a subject which will be particularly alluded to in the discourse which follows.

* It is my pleasing duty to state a fact which is in the highest degree creditable to Mr. Arrowsmith. That acute and indefatigable geographer, without any other guide than his own comparison of somewhat discordant materials, had placed upon his map the point of the confluence of the Burdekin and Cape Rivers, or Mount McConnell, at not more than ten miles in error of the precise longitude, $156^{\circ} 50'$ E., determined by Gregory: for the latitude only had been fixed by Leichhardt, viz. S. lat. $26^{\circ} 30'$.—R. I. M.

† See Sir W. Hooker's Journal of Botany.

The President, having read the preceding grounds of the award, rose, and thus addressed the Right Hon. Henry Labouchere :—

“Mr. Labouchere,—Having taken for many years the liveliest interest in the exploration of North Australia, it has been peculiarly gratifying to me to see this very difficult operation effectually carried out by a surveyor of the Australian colonies, so admirably qualified to ensure success as Mr. A. C. Gregory.

“On this memorable occasion I rejoice that you, Sir, her Majesty’s Secretary for the Colonies, under whom this great task has been happily terminated, should have honoured us by attending here to receive for the explorer of North Australia the Founder’s Medal of our Society, which I request you to transmit to Mr. Gregory with the expression of our entire and hearty approbation of his conduct.”

Mr. Labouchere replied :—

“Sir,—It affords me sincere pleasure on this occasion to receive, on the part of Mr. Gregory, this well-merited mark of approbation of the Royal Geographical Society. That gentleman had been selected by the Government for the arduous and important task of exploring the vast regions yet unknown to civilized man in North Australia, and the manner in which he has performed it has amply justified the selection.

“Of Mr. Gregory’s scientific qualifications it would ill befit me to speak before such an audience, but I may advert to those moral qualities which were not less necessary to an explorer of those vast solitudes. Sir William Denison, in a despatch which rendered a high testimony to the merits of Mr. Gregory, observed that it was to his prudence and courage that the safe return of the entire party was probably due.

“You have called attention, Sir, to the description which Mr. Gregory gives of the soil and climate on the banks of the Victoria river; and, indeed, it is of such a nature that it is no extravagant supposition that some of us may live to hear of that hitherto unknown region becoming the home of a prosperous English settlement.

“Such anticipations have always been a source of great gratification to my mind; for I believe that, among the many blessings and advantages which have been permitted to this country, none ought to be ranked higher than, that she should have been enabled to scatter so widely over the globe the manners, the freedom, the civilization, and the religion of Englishmen.”

Mr. Labouchere concluded by assuring the Meeting that he would transmit the medal which he had received from the hands of their distinguished President to Mr. Gregory, who, he was sure, would highly value such an honour.

The President then continued :—

The Council has adjudicated the Victoria or Patron’s Gold Medal

to Lt.-Colonel Andrew Scott Waugh for his valuable and able extensions of the Great Trigonometrical Survey of India, and particularly for his recent triangulation carried on through Rajputana, the Panjab, and the Himalayan Mountains, thereby adding to our geography an accurate and intimate knowledge of a part of the globe most interesting to mankind at large, and of vital importance to Great Britain in particular.

This Trigonometrical Survey of India was commenced by Colonel Lambton in 1803, and continued by him till his death in January 1823. During that period he measured an arc of the meridian from Punnæ in $8^{\circ} 9' 35''$ near Cape Comorin to Damargidda in lat. $18^{\circ} 3' 16''$, being about ten degrees of latitude, and extended a net of triangles over the south part of the Peninsula of India, reaching on the east side of the principal meridian to the 19th parallel. Colonel Everest, who had been his chief assistant since 1817, and succeeded him at his death, completed the section commenced by Lambton, and extended the arc to Seronj, lat. 24° , near which place he measured a base of verification. This is the most important base in the Trigonometrical Survey of India, as all the work to the north, east, and west is dependent upon it. Colonel Everest carried on the measurement of the meridional arc to its completion in the Dehra Dûn, lat. $30^{\circ} 19'$; the whole extent from Cape Comorin being $22\frac{1}{2}^{\circ}$ of latitude. He also extended a longitudinal series from the Seronj base to Calcutta, in the neighbourhood of which he measured a base of verification. From points selected on this series originate distinct sets of meridional series, the northern limits of which are united by a longitudinal series running along the foot of the great mountain chain, which thus completes the triangulation of that vast tract, comprising about 223,000 square miles.

When this distinguished officer left India, Colonel, then Captain Waugh, who had been his chief assistant since 1832, was appointed his successor in December 1843, and following up the admirable plan of survey laid down by his predecessor, the principles and methods of which have been described by Everest,* he worked out the several series left unfinished between the meridional arc and that of Calcutta. Finally he measured a base of verification at Sonakoda, lat. $25^{\circ} 18'$, long. $88^{\circ} 18'$, and also completed the triangulation of the south coast series from Calcutta to Ganjam.

Colonel Waugh then commenced operations on the west of the great meridional arc, and measured a longitudinal series from the

* Account of the Measurement of the Arc of India. 2 vols. 4to., 1847.

base at Seronj, passing through Rajputana and the sandy desert to Karachi, upwards of 700 miles in extent, where a base of verification was measured, whilst the triangulation of the Bombay meridian was connected with this series. He further extended another series in a north-west direction from the stations of the meridional arc, Banog and Amsot, through the plains of the Panjab and a great portion of the mountainous tract to Peshawar. Again, a base of verification was measured near Attock, the series embracing an area of about 67,000 square miles. A meridional series is far advanced from the base at Karachi, along the Indus, to that near Attock. This operation will complete a gigantic geodetical quadrilateral, of which the great arc series forms the eastern side. Simultaneously with these trigonometrical operations, most minute and elaborate topographical surveys have been executed under the superintendence of Colonel Waugh throughout the greater portion of these tracts.

Lastly, having determined that of all the mountains whence the affluents of the Ganges run, the loftiest summit is situated about midway along the Himalayan chain, and finding that this culminating point (N. lat. $27^{\circ} 56'$, E. long. $86^{\circ} 53'$) was 29,002 English feet above the sea, and consequently 846 feet loftier than the famous Kinchinjunga of Nipal, Colonel Waugh has gratefully and appropriately named this, the highest known elevation in the world, **Mount Everest**, after his valued geographical instructor.

These great results appear to come peculiarly within the scope of the Society, which takes for its motto "*Ob Terras Reclusas*;" for eight years ago, the mere exploration of the tracts in question would have been deemed impracticable, whereas under the direction of our Medallist, a vast portion of these countries is now accurately delineated, on the basis of astronomical observations, connected by the highest appliances of modern geodetical science and art.

The President rising thus addressed Colonel Everest:—

"Colonel Everest,—The reasons which induced the Council to adjudicate the Patron's Gold Medal to Lt.-Colonel Waugh having been made manifest by the document I have just read, I now place this our tribute to his ability and success in your hands, requesting you to convey it to your eminent associate, with the assurance that we deeply appreciate the importance of his labours.

"By transmitting this Medal, through your medium, to the officer who learnt his lessons under your able guidance, the Royal Geographical Society recognises the right of your predecessor Lambton and yourself to have had similar distinctions: and I rejoice that by

this one act, the Grand Trigonometrical Survey of India should now receive a reward which it so long ago merited."

Colonel Everest replied :—

" Mr. President,—I beg to return my acknowledgments for the complimentary terms in which you have been pleased to advert to the labours of my honoured predecessor and myself, and on behalf of my esteemed successor Lieutenant-Colonel Waugh to express the warmest thanks to yourself and the Royal Geographical Society for the very proud mark of distinction which has just been conferred on him, by the award of the Patron's Medal of this year.

" The applause of our fellow men is naturally prized by us all, and nothing is more cheering to a person engaged in an arduous undertaking, replete with privations and hardships, than the persuasion that, if he endures to the end, his labours will not be unrequited. Colonel Waugh, however, is not of that stamp to need such a motive to induce him to persevere in the strict performance of his duty, and having no precedent which could hold out the prospect of such a distinction as the present, it will come on him altogether as an unexpected boon, and as such, will be additionally acceptable. I am certain that this Medal will be received by Colonel Waugh with the deepest and most sincere feelings of gratitude and respect for those who selected him for the proud honour of possessing it, and not only by himself, but by all the members of the department of which he is the chief, will this adjudication be hailed as an earnest that there is a body of gentlemen most qualified by their talents and knowledge to form a judgment, and as willing, as able to act according thereto, with right singleness of purpose. Sir, if anything could enhance the value of this mark of distinction, it is the circumstance that it has been conferred during the presidency of a gentleman of wide renown—known wherever civilization reaches—acknowledged even by our antipodes as one of the first geologists of the age, and not more distinguished by his scientific attainments than by his courtesy, urbanity, and kindness of heart.

" The Trigonometrical Survey of India has been in progress ever since 1803, a period of 54 years, and will, in its entirety, embrace a tract which exceeds the area of Great Britain and Ireland in the ratio of about 12½ to 1. Of course a vast deal still remains to be accomplished before so gigantic an undertaking can be pronounced complete; and as Colonel Waugh has now been engaged in this arduous task for 25 years, it is needless to expect much prospective effect from the present award as far as he is concerned, for his career in India must be drawing towards its close; but the memory of the present graceful act of this Society will assuredly not be lost on his eventual successor, or on India in general. He is still in the prime of life; and though he has suffered lately from more than one severe attack of illness, yet it is to be hoped that the injury which his constitution may have thereby sustained, is not greater than can be restored by a return to his native country, and that he will some day arrive to return his thanks in person to the Royal Geo-

graphical Society, and by his co-operation and counsel add fresh vigour to the active exertions of a body so effective—the first—the only learned Society in England, let me say, which has ever held out the hand of sympathy, friendship, and encouragement to the Great Trigonometrical Survey of India.

“Mr. President and Gentlemen, I thank you for having listened to me so patiently, and I conclude with my earnest wishes, that the prosperity of this Society may continue, until every portion of this globe shall have been as satisfactorily explored and as accurately delineated, as the regions under the influence of the Honourable East India Company.”

A D D R E S S
TO THE
ROYAL GEOGRAPHICAL SOCIETY
OF LONDON;

Delivered at the Anniversary Meeting on the 25th May, 1857,

BY SIR RODERICK IMPEY MURCHISON,

G.C.S.S., D.C.L., F.R.S., &c.,

PRESIDENT.

GENTLEMEN,—Having been called, through your kindness, to resume the honourable duty of presiding over you at a season, when the Royal Geographical Society has attained a condition more flourishing than its warmest well-wishers had anticipated, it is grievous to open this Address by dwelling upon the decease of my predecessor, the gallant Admiral Beechey, as well as that of my successor when I vacated this chair in 1854, the noble Earl of Ellesmere. Never since the foundation of our body has the hand of death fallen so heavily and so rapidly upon our leaders, and never has a more painful task been thrown upon your President, than that of recording the loss of two such men, however mitigated by the endeavour to do justice to their eminent and dignified characters. To delineate all their merits, even if I had the power, would be impracticable in the brief space of time to which I can lay claim on this occasion, and I shall, therefore, simply endeavour to place on record some of the salient features in the characters of my lamented friends, which more particularly connect them with the great pursuits of this useful Society.

Rear-Admiral Frederick William BEECHEY, the son of the late Sir William Beechey, R.A., was born in February, 1796, and before he reached the age of ten years was already serving as a midshipman in the Royal Navy. He bore a part in Commodore Schomberg's brilliant and decisive action off the Isle of France in 1811, and

after active employment in the expedition to New Orleans in 1815, he soon attained the rank of Lieutenant.

In 1818, public attention was again attracted to Polar exploration, which had been neglected during a lapse of forty-five years, chiefly through the exertion and energetic writings of our associate, the late Sir John Barrow. Lt. Beechey then served in the expedition under Buchan, and was appointed to the *Trent*, commanded by Franklin, who was also accompanied by Back. Having coasted the west side of Spitzbergen, they were finally arrested by heavy floe-ice in lat. $80^{\circ} 36' N$. From some mistaken feeling on the subject, no account of the proceeding was published till 1843, when Beechey, remembering old Hakluyt's imputation on some of our early writers, who he says "should have used more care in preserving the memoirs of the worthy acts of our nation," brought out, under the authority of the Admiralty, a most interesting narrative of the voyage.

Subsequently our adventurous young officer joined the *Hecla*, and assisted the first great effort of the celebrated William Edward Parry (his former shipmate) to cut through the barrier of ice into Barrow Strait, beyond the 110th degree of west longitude, for which these officers and their companions justly received a parliamentary reward. In 1821-2 he had the good fortune to serve under the orders of our former esteemed President, Admiral W. H. Smyth, then surveying the Mediterranean, in co-operation with whose ship, the *Adventure*, he explored a considerable portion of the north shore of Africa.

During the three and a half succeeding years the sands of Cyrenaic Africa were exchanged for Pacific and Arctic researches, when, commanding the *Blossom*, Captain Beechey made accurate surveys of many islands in the Pacific, of the coasts of Russian America and of Behring Strait, of all of which he has left an admirable record in the work entitled '*Narrative of a Voyage to the Pacific and Behring Strait, to co-operate with the Polar Expedition.*' In this publication, our respected President has left a record of scientific knowledge which places him high among the standard authors of our time.

To one portion of this work, which describes the exhumation of such vast quantities of bones of mammoths and other extinct mammalia from the cliffs of Escholtz Bay, in Russian North America, the late Dr. Buckland has rendered full justice.

At a later period, Captain Beechey surveyed the west coast of South America, and determined many points of high geographical

importance. Lastly, examining the shores of the Irish Channel, and performing much severe and valuable service to the detriment of his health, he produced many highly useful charts, and threw much light on the nature of the Channel tides. The result of these, his last labours afloat, was the publication of two very able and valuable memoirs in the 'Philosophical Transactions.' The first of these (in 1848) was entitled 'A Report of Observations made upon the Tides in the Irish Sea, and upon the similarity of the Tidal Phenomena of the English and Irish Channels,' &c. The principal object of the author was to point out the independence of the *set* of the *tide-current* in those seas, on the actual *state of the tide* as ebbing or flowing; and he showed, by a masterly exhibition of the facts, that there is no apparent connection between the direction of the stream and the rising or falling of the water. In addition to this, he laid down instructions for ascertaining the state of the tide, the value of which was much enhanced by two explanatory charts and many smaller diagrams.

This memoir, addressed to Sir F. Beaufort, was followed in 1851 by another letter to the same eminent hydrographer, which was written with the hope that its contents, when sufficiently known and circulated, would be the means of diminishing the number of those losses of both life and property, with which the annals of Lloyd's abound, and of advancing our knowledge of the tides, by the practical illustration of the phenomena of the tidal streams of straits under the influence of a combined wave.*

After the cessation of his arduous maritime exertions, Captain Beechey was appointed to the important post of Superintendent of the Marine branch of the Board of Trade, the duties of which he executed to the day of his death in a manner which drew from every successive Minister of the Department, the warmest acknowledgments of that clearness and precision of thought, and that skilful performance of official duty, which characterized our late President throughout his whole career.

Obtaining the rank of Rear-Admiral in 1854, he succeeded the Earl of Ellesmere in this Chair in 1856, and we all know with what sincerity he devoted his energies to the advancement of geography, how ably he directed our proceedings, and with what urbanity he presided over our meetings. Alas! I have too much reason to believe that the zealous endeavours he made to serve us, combined

* Phil. Trans., 1851, p. 717.

with the important duties of his office in regulating and improving the scientific instruction of the mercantile marine, acting on a constitution which had been sorely tried in many a clime, hastened that catastrophe which we so deeply lament.

Not long after his election to the post of President he was attacked by a severe illness, from which he only partially recovered during a summer's voyage in the yacht of the Trinity House. To that malady he feelingly alluded in the opening part of his excellent Anniversary Address—the only one he was permitted to deliver—when he thanked the other officers of our body for the effective manner in which they had conducted the affairs of the Society during his absence. On coming with his family to Tunbridge Wells in the autumn, where I happened to reside, I found that our zealous President was suffering from a disease of the heart. His affectionate wife and daughters then felt indeed, as well as myself, that the utmost tranquillity was essential to the preservation of his valuable existence; but he persisted in struggling with unflinching spirit to transact business both at the Board of Trade and in our Society. So dominant was this feeling that on Monday the 24th November, Admiral Beechey attended the rooms of this Society, and gave me, as the Vice-President he had selected to represent him, precise directions for conducting the business of the Council and of the evening meeting of that day. On Saturday, the 29th, alas! he was no more, thus exhibiting that firm resolve to do his duty to the last, which has ever been the glory of those British seamen among whom Admiral Beechey stood pre-eminent. He had long been a distinguished Fellow of the Royal Society, and was a member of the Council of that body at the period of his decease.

FRANCIS, Earl of ELLFSMERE, a Knight of the Garter, Lord-Lieutenant of Lancashire, and our President during the years 1854-5, was the second son of the first Duke of Sutherland, and that gifted lady the Duchess Countess of Sutherland. He was born in 1800, and died on the 18th of February, 1857.

In endeavouring, with the approval of the Council, to induce this accomplished nobleman to succeed me in occupying the Chair of this Society in the year 1854, I felt certain, from an acquaintance of thirty years' standing, that through his varied knowledge, generous nature, and love of geography, he would render us right good service. His conduct in directing our affairs has indeed met with your hearty approval; and as we lamented that our

rules, limiting the presidential duties to two years, led to his retirement, so we have now to grieve over his demise, at the comparatively early age of 57.

Educated at Eton, and distinguished at Oxford, Lord Francis Egerton soon took a high place in the House of Commons, and served with ability both as Secretary for Ireland and Secretary at War. As he advanced in years he seemed to care less and less for political distinction; and as it is not my calling to dwell on his ministerial or parliamentary career, let me briefly remind you how he occupied many hours of his well spent life in cultivating and cherishing letters, science, and art.

I will first speak of those anonymous writings which, as they have exercised a salutary influence on society, ought to be made known, both to render justice to the man, and to indicate the great variety of his requirements.

My auditor, who may have only known Lord Ellesmere as a member of either House of Parliament, or as our President, may not be aware that between the years 1834 and 1854 he was the contributor of not less than fifteen articles to the '*Quarterly Review*;' and that about one-half of them were connected with the development of geographical research. Eschewing the troubled arena of party strife, he left no trace behind him of political acrimony even in those essays which touched upon disputed questions; whilst all of them, which did not bear upon the science we cultivate, were devoted to the fine arts, of which he was a true connoisseur, or to biography, and those military exploits which have raised the glories of Britain.

On geographical subjects he began by such attractive accounts of the works of the Dutch authors Meiglan, Fischer, and Doeffl, that any one who will peruse his '*Sketches of the Manners and Usages of the Japanese*' will find in them a most vivid picture of the life of that curious people, who, inhabiting a region separated from either continent, are apparently destined to remain longer an unbroken unit than the colossal empire of China. Of the Japanese he humorously wrote that he "left them to the complacent enjoyment of the conviction that they are the first of nations, and the eldest descendants of the Deity."*

Turning to the Eastern Archipelago, he has consigned to us a

* *Quarterly Review*, vol. lii. p. 317; vol. lvi. p. 428.

In his recent translation for the Hakluyt Society, of the Père d'Orléans' '*History of the Tartar Conquerors who subdued China*,' Lord Ellesmere was largely assisted by his accomplished daughters.

memorial of the lively interest he took in that chivalrous expedition of our old associate, Sir James Brooke. After a preliminary sketch of the preceding wretched condition of Borneo, condensed from the descriptions of Sir Stamford Raffles, he painted, with the hand of a skilful master and a warm friend, all that the adventurous Irish gentleman was accomplishing. Every old member of the Raleigh Club and of this Society, recollecting the deep interest we felt in the successful voyage of the little schooner of the Yacht Club, fitted out by Mr. Brooke, will re-peruse with gratification the lines, which indicated that the young explorer of that day was destined to become the Rajah of Sarawak, and to receive not only our gold medal, but his due reward at the hands of his Sovereign.

Then, in his analysis of Arctic and Antarctic researches, Lord Francis Egerton gave long ago earnest that he was worthy to become our leader. In his review of the narrative of discoveries on the north coast of America, made by the officers of the Hudson Bay Company, in which the enterprising Simpson lost his life, we find him evincing those large views and kindly feelings which led him invariably, in subsequent years, to countenance and support those expeditions in the search after Franklin, which have shed so much lustre upon our country.

Again, when commenting in 1847 upon the memorable Antarctic discoveries of Sir James Ross and the natural history collections of Dr. J. Hooker, we see how emphatically he dwelt upon the exploits which he anticipated from our Arctic heroes when he penned these lines :—

“ With interest which accumulates by the hour do we watch for the return of those two vessels, which are perhaps even now working their way through Behring Strait into the Pacific. Should the happiness be yet allowed us of witnessing that return, we are of opinion that the *Erebus* and *Terror* should be moored henceforth on either side the *Victory*, floating monuments of what the Nelsons of discovery can dare and do, at the call of their country in the service of the world.” *

This was one only of the many soul-stirring paragraphs indited by my noble friend on a subject so near to his heart : one on which he never abandoned hope, as proved not only by his signing, with many of us, last year that petition to the Government, which is printed in our Proceedings,† praying for the final search of a

* Quarterly Review, vol. lxxxi. p. 167.

† Proc. Roy. Geogr. Soc., No. 1., p. 25, June, 1856.

limited Arctic area, but also by his willingly undertaking to make that appeal to the House of Lords in the last session of Parliament, which, in his unavoidable absence, was effectively made by Lord Wrottesley, the President of the Royal Society.

Among the last of Lord Ellesmere's anonymous contributions on geographical subjects immediately preceding his two eloquent addresses to this Society,* I may advert to his lively account of Castens' Expedition among the Lapps, in which he justly eulogised that enterprising leader of his learned countryman Wallin, the successful explorer of Auerne. In other fragments of periodical literature he indicated his accurate and right estimation of engineering works in the article on the Skerryvore Light House, and again in a very instructive Review of the progress in canalization, proceeding as it did from the subject of the great Bridgewater Canal.

Of his taste and acquaintance with the fine arts, Lord Ellesmere has left positive evidences in the pages devoted to his estimate of English artists, and to the elucidation of fresco painting. Liberally equipped with wealth in making well chosen additions to the gallery of paintings he inherited he cared for their preservation, and for the residence of his family, that palatial structure designed by Sir C. Barry, which has scarcely a rival in our metropolis.

A distinctive feature in the character of Lord Ellesmere was his deep admiration of martial deeds. His veneration for the Duke of Wellington, founded upon a study of his campaigns, was matured by a personal interview of nearly years, during which the great Captain himself told his memories, which enabled our deceased President to give to the world a clear and well condensed account of the battle of Waterloo.

The spirited sketch of the life of Blücher, the "Marshall Vorwärts" of the Prussian despatches, written in 1842,† was followed in 1843 by a more extensive analysis of the French and English versions of the battle which decided the fate of Napoleon ‡. On these writings, coming as they did from an acknowledged "Historical Writer," implicit reliance may be placed, and few historians, I venture to say, will regret any manner the style in which the reminiscences of the illustrious Commander were conveyed to the public by our deceased Associate. In all such writings, whether he went back to the days of Waterloo and followed the struggling career of the old

* Quarterly Review, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 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Scotch General Patrick Gordon,* who fought so well for the Czar Peter, or entered with the lamented Cathcart into the Russian and German campaigns of the first Napoleon,† or stood forth in the hour of trial as the champion of his dear friend the brave Lord Raglan, we invariably applaud the generous sentiments and true appreciation of merit which ever guided the pen in his portraiture of a hero.

The versatility of the talents of Lord Ellesmere was displayed in numerous other works published under his own name. A poet by nature, verses, whether martial, plaintive, or jocose, flowed freely from his heart, and the principal of these being collected under the title of the '*Pilgrimage and other Poems*,' the author, with his habitual modesty, spoke of them in his preface as being a collection of the least unpopular of his works.

A master of several languages, he frequently put before his countrymen, in good easy English, the thoughts of eminent foreign authors, and of these efforts, the translations of Goethe's '*Faust*' and Schiller's '*Wallenstein*' are prominent examples. The number of foreign works which he translated may well surprise us, when we reflect upon his numerous occupations, and among them I may enumerate Clausewitz's '*Campaigns of Russia*,' the '*Siege of Vienna by the Turks*,' and the '*Last Military Events in Italy*.'

Returning to my noble friend's connection with science, let me ask any old member of the British Association if he ever heard from the President of the year a more inciting appeal than was made by Lord Francis Egerton at the Manchester Meeting of the year 1842. Ranging from science to letters and art, he proved that he truly merited the application of that line with which he honoured his predecessor, Dr Whewell—

"Through each mesh of the lyre, and was master of all."

It was then that I rejoiced in being one of those assembled at Manchester, to bear witness that this distinguished nobleman, the possessor of large domains, was as truly esteemed by every artisan of that vast hive of industry, as he was beloved by his tenantry and agricultural labourers.

If it was specially when surrounded by his family and friends that the genuine heartiness and wit of the man came out most strikingly, every public act of his life was carried out with such steadfast sincerity and true liberality, that, whether he presided over a Royal commission, a literary or scientific society, or a parish vestry, he did his duty with his whole heart. Philanthropy and generosity

* Quarterly Review, vol. xc. p. 314.

† *Ib.*, vol. xc. p. 1.

were to be discerned, indeed, in all his actions by those who knew how quietly and unostentatiously he sustained with his purse men of genius, who were labouring under difficulties, and who, but for his timely aid, could never have produced works which have taken a high place in science and letters.* These acts were well crowned by that full-handed munificence with which he strove to succour our famishing and ill-clad soldiers in the Crimea.

In addition to the stores of varied knowledge which he could at all times playfully and instructively draw forth from his capacious mind, there was in Lord Ellesmere a fund of cheerful benevolence which bound to him affectionately every one who enjoyed his friendship. I cannot therefore better sum up the leading merits of our former President than in the expressive words of one of his most intimate and valued companions :—

“ His calm exterior and tranquil manner covered a deep-seated enthusiasm for the honour of his country, for the progress and amelioration of his species, and for all that was grand and noble in sentiment or in action.

“ They can bear testimony to this truth who have seen him kindle over the recital of some great battle of the Great Duke, or some less famous deed of individual heroism,—who have witnessed the eager interest with which he watched the bold enterprises of modern navigation,—or who have heard his lucid and animated explanations of the mechanical inventions for diminishing labour, or perfecting manufactures, in the vast workshops connected with his canal property. While his ardent spirit rejoiced in every discovery achieved by science, and every new phase of beauty elicited by art, his accumulated knowledge and cultivated taste enabled him to appreciate the merit and calculate the consequences of each; and he was ever ready to employ the influence of his position, the vigour and liveliness of his pen, and the princely contributions of his purse for the furtherance of such purposes.

“ His high estimation and assiduous study of the science to which the Geographical Society is especially devoted, were the result of that large range of knowledge which opened his mind to its infinite relations—moral and material, social and political—with the future destinies of mankind. In him the geographer was blended with the statesman and the philanthropist, not in wild and utopian spe-

* Let me cite one of several cases known to myself. When the eminent naturalist Agassiz was likely to have the publication of his great work ‘*Les Poissons Fossiles*’ stopped for want of means, Lord Ellesmere gave 500*l.* for the original drawings, which he immediately presented to the Geological Society.—R. I. M.

culations (for the poet's imagination was controlled by a sober judgment and a jealous love of truth), but in those prescient views which result from extensive acquaintance with the physical circumstances of remote regions, and from well-reasoned calculations of their several capacities for the advancement of civilization and the increase of human happiness." *

Suffering from complaints with which he had long struggled, and aware that the climate of Lancashire was hostile to his frame, Lord Ellesmere still persisted in residing during a portion of the year in that district where he felt he had, by the will of Providence, a responsible task to perform. Raising, therefore, a beautiful edifice near the entrance of his own great Bridgewater Canal, and little distant from the town of Manchester, expending large sums in building churches or founding schools, and ardently pursuing every plan for the bettering of the moral and social condition of the people, he braved the moisture of the climate, and only succumbed when, amidst the blessings of all to whom his influence extended, he had effected the main objects for which he lived. Well might the clergyman,† who preached the funeral sermon over his bier, point, not merely to the exalted character of the statesman, the orator, and the scholar, but specially to the true Christian, the lamented Lord of Worsley Hall, in whom all the surrounding inhabitants felt that they had lost the generous patron, the liberal, indulgent master, the charitable and tender-hearted soother of distress and poverty.

In short, as it was impossible to know him well and not to love him, so the deep sorrow which his death called forth is the noblest monument to the memory of the good Earl of Ellesmere. Such, doubtless, is the real consolation of the high-minded and devoted widow, who, cordially participating in all his acts of beneficence, is left to encourage her children to imitate so bright an example.

DR. WM. BUCKLAND.—Lost to the world and to his numerous admirers for several years through an impaired state of the mental faculties, caused by a diseased state of the bones at the base of the skull and of the neck, my valued friend, Dr. Buckland, the Dean of Westminster, expired on the 14th August, 1856, at the age of 73.

The principal merits of this eminent man and the leading events of his life having recently been brought before the Geological Society,‡ of which he was one of the early members, as well as before

* Extract of a letter from Mr. Ralph Sneyd to myself.

† The Rev. St. Vincent Beechey, M.A., brother of our last President.

‡ See Address of the President, Col. Portlock, R.E., F.R.S., Quart. Journ. Geol. Soc. 1857.

the Royal Society, whose chief honour * he had received, it does not become me to attempt any analysis of those writings upon the structure of the globe or its former inhabitants, which have been justly regarded as among the chief stepping-stones to the present state of geological science. I will, therefore, confine myself to a brief sketch of a few points in his character, which may convey to those who knew him not, some idea of the powers and habits of this great geologist.

Educated at Tiverton and Winchester, he obtained from the latter school a scholarship in Corpus Christi College, Oxford. There it was that, after he had become a tutor in classics, a youth came to the University (Oriel College), who, having already attained an acquaintance with fossil organic remains, was destined through that knowledge to influence the future career of many of his associates who had similar tastes. This was William John Broderip, afterwards my colleague during five years as joint secretary of the Geological Society, and now well known as one of the eminent naturalists of our age.

The study of the collection made by this juvenile companion, including the jaw of a marsupial quadruped found in the Stonesfield slate, first awakened the dormant talent of Buckland. Cultivating the friendship of the precocious fossilist, he soon developed that peculiar power, which characterized him through life, of catching up and assimilating with marvellous rapidity everything that illustrated the new science of fossil organic remains, then just coming into vogue through the work of Parkinson. So strongly did Buckland feel in after years the deep obligations he was under to young Broderip, that I have myself heard him speak of the latter as his "tutor in geology."

Admiring the original efforts of William Smith, who, in identifying strata by their organic remains and by his geological maps, has worthily acquired the title of Father of English Geology, Mr. Buckland made numerous excursions to examine the rocks in various districts, and in so doing sought out the few promoters of the rising science. The kindred scientific spirits of his Alma Mater, whether older men or of about his own age, were Pegge, Kidd, and John and William Conybeare, the last mentioned, now the Dean of Llandaff, rising afterwards to be the rival of our deceased member as the celebrated author of the 'Outlines of the Geology of England and Wales.' Thus working onwards he qualified him-

* The Copley Medal.

self to obtain that post of Reader in Mineralogy and Geology, in performing the duties of which, he had the great merit of rousing the University of Oxford from its lethargy in respect to the natural history sciences, and in rendering attractive the study of primeval nature.

It is true that his predecessor, Dr. Kidd, had opened out some good paths in the science of mineral geology; but it was reserved for Buckland to create, by his native eloquence and his illustrations, a real and solid taste for geology properly so called, whether as based upon the records of lost races of animals, or on physical geography and the mineral composition of rocks.

Those persons who, like myself, can go back to the days when our deceased member was an inmate of Corpus Christi College, can never forget the impression made upon his visitors, when with difficulty they discovered him in the recess of a long collegiate room, seated on the only spare chair, and buried, as it were, amidst fossil bones and shells. So strange was this conduct considered by the graver classicists, and so alarmed were they lest these *amœnitates academicae* should become dangerous innovations, that when he made one of his early foreign tours to the Alps and parts of Italy, which enabled him to produce one of the boldest and most effective of his writings, an authoritative elder is said to have exclaimed, "Well, Buckland is gone to Italy, so, thank God, we shall hear no more of this *geology*!" Augmenting his class of students, however, Dr. Buckland persevered successfully in spite of the opposition of the pedagogues of the old school, and certain narrow-minded theologians, who, ignorant of the imperishable records which the Creator has set before us in the book of Nature, endeavoured to destroy the moral influence, if not the character, of any clergyman who boldly taught those undeniable truths. Success happily attended his efforts, and if Buckland had done nothing more than educate a Lyell, a Daubeny, and an Egerton, he would justly have been placed among the most successful instructors of our contemporaries.

Marking the progress which has been made in this branch of science in the few years which have elapsed since it was publicly taught, we may indeed well look back with pity on its feeble opponents, and rejoice that the alumni of the Buckland school have become such strong men, and that the chair, which owed its origin to my illustrious friend, should now be filled by that sound geologist, John Phillips, the nephew of William Smith, who has added to the genius of that geological lawgiver, the richest accom-

plishments of modern science. The publication of his first remarkable work, the '*Reliquiæ Diluvianæ*,' naturally secured for Buckland honours and advancement, and through the patronage of Lord Grenville he obtained a canonry in Christ Church. Shortly afterwards Sir Robert Peel, with the appreciation of true merit which characterised him, sought out and cultivated his intimacy, and then came forth that '*Bridge-water Treatise*' with which his name will be long identified. For to whatever extent new data have since been obtained, this volume will ever remain a proof of the fertility of illustration with which he could reconstruct and set before us the forms of bygone periods,* and thus make evident to all, the prescience of the Almighty as exhibited in former epochs of creation. In a subsequent year we find Sir Robert Peel, to his great honour, presenting Buckland to the Deanery of Westminster, in which position, notwithstanding his hospitality and important occupations, he still found time to travel to and from his Alma Mater, and lecture on his favourite science, till he was stricken down with the illness from which he never recovered.

But let no one imagine that, whilst some of his leisure hours were thus occupied, including arduous efforts to improve the agriculture of our country, Dean Buckland was inattentive to his duties as the Head of an important Ecclesiastical Body. Not only do his surviving colleagues advert with marked respect and gratitude to his judicious efforts and his honourable conduct in improving their establishment, but the public owe to him their real thanks for the energy and determination with which, in a brief space of time, he effected the reform of abuses which had crept into the ancient school of Westminster. In that Foundation, education could no longer be obtained except at costly charges, and even where these were paid, the youths were ill fed and worse lodged. All these defects were speedily rectified by the vigour and perseverance of Dean Buckland. The charges were reduced, good diet was provided, the rooms were well ventilated, and the building properly underdrained: so that, these physical ameliorations accompanying a really sound and good system of tuition, the fame and credit of this venerable Seminary were soon restored.

As it must be my effort when occupying this chair to connect every deceased member with geographical science, let me assure you, from long personal acquaintance with Dr. Buckland, and hav-

* This work, which was rendered much more valuable by the recent discoveries of Professor Owen, was revised by Mr. Broderip.

ing, indeed, received some of my first lessons in the field from him, that he was really a good physical geographer. No one who followed him even from the valley of the Isis to the summit of Shotover Hill, can ever forget how forcibly he impressed upon the minds of his auditors, the causes which had operated in producing the outlines of the ground—how well he made his pupils comprehend why water rose in wells at certain spots and levels, and why other tracts were dry, or how he taught the young agriculturists the elements of draining, and showed them where the vegetation changed as dependent on the nature of the subsoil.

To whatever realm he travelled, whether over the undulations of Germany or the heights and glaciers of the Alps, he adroitly applied and extended these views, and everywhere exemplified (what I have endeavoured to imitate in my own walk) that union of geology with geography, without which the latter science is deprived of its firmest foundation.

While Dr. Buckland evinced enthusiastic zeal and great ability in the development of any phenomena connected with natural history which he could detect, whether in the organization of animals or of plants, he also often sought to apply his science practically. Thus, the most remarkable of these efforts, which I can now call to mind, proceeded from one of his own discoveries. Perceiving that certain fossil convoluted bodies, when extracted from their native bed in the lias of Gloucestershire, presented the appearance of *faeces*, which had assumed that form from passing through the intestines of reptiles or fishes, he submitted the substances to analysis, and when they were pronounced by the late Dr. Prout to be chiefly composed of phosphate of lime derived from the bones of animals, and that even fragments of the bones were detected in them, he assigned to these bodies the name of “Coprolites.” With a fervid anticipation he was afterwards led to hope that these fossil bodies would prove of real use to agriculture; and one of the many regrets I have experienced since his bright intellect was clouded, was that my friend had not been able to appreciate the truly valuable results that have followed from this his own discovery, which, at the time it was made, was treated as a curious but unimportant subject, and almost scouted as being too mean for investigation. The hundreds of tons of these phosphatic coprolites and animal substances which are now extracted to the great profit of the proprietors of Cambridgeshire and the adjacent counties, for the enrichment of their lands, is a warning commentary to those persons of

the "uni bono" school, who are ever despising the first germs of scientific discovery.

The full and true character of Dean Buckland is not, however, to be measured by reference to his works only, including his records of those extinct Saumans of which he was the great historian, or his chief work, the 'Bridgewater Treatise,' nor even by his discoveries in a new science. The indelible impression he made upon all who listened to his instructive lectures—lectures like those which may still happily be heard at Cambridge from the lips of his illustrious contemporary, my old friend and coadjutor Sedgwick—and the general influence he exercised over society by the energetic and telling manner in which he inculcated his doctrines, as founded on the creation of the progress of nature from the earliest periods to that epoch which preceded the era of his own cavern mammals, the same the appeals which have procured for him a name which will last as long as the school of British geologists, of which he was so eminent a leader, shall be remembered!

In closing these few sentences, which, if I were addressing a learned Society, might be expanded into a volume descriptive of the merits of one to whom I was sincerely attached, let me add that in his accomplished sister, our lamented member has left behind him a truly intellectual and excellent woman, who, aiding him in several of his most difficult researches, has laboured well in her own right, and her children, worthy of their father's name.

Dr Buckland was a member of many European and American Academies, and a Correspondent of the Institute of France. Every where he was at all great British meetings, and in every social party, was warmly welcomed as the most cheerful and most successful contributor to the advancement of natural knowledge.

Major-General Nicholson, who recently died in Paris on his return from India, was one of our Quartermaster General's servants in the East India Company's service, in which he was distinguished for his zeal and intelligence. He was best known to us as the author of the large Military Sketch map of Scinde. During his stay in this country on leave of absence, he was one of the officers of the Indian Army who attended the funeral of the Duke of Wellington, and was always a welcome and agreeable guest at our Club and Evening Meetings.

Christian Thomas Jones, Esq., who recently fell under the knife of a Maltese assassin, was the son of a gallant officer of the same name and rank. Entering the army in 1816, and serving in several

vessels on foreign stations, he was chosen, through his merits, to form one of the scientific complement of the *Adventure*, in which ship young Graves played so able a part, that his Captain, now Admiral W. H. Smyth, and other officers strongly urged his promotion. During the next five years, he was a companion of that excellent officer the late Rear-Admiral Philip P. King, in his extensive surveys of the Straits of Magellan and the adjacent shores of South America, and it was only during that difficult service, and in the year 1827, that he was appointed a Lieutenant, *i. e.*, after ten years of arduous probation.

After performing, in conjunction with the Royal Engineers, a survey of Lough Neagh in Ireland, the next ten years of the life of Captain Graves were spent in surveying the Greek Archipelago, first in command of the *Beacon*, and next of the *Volage*, corvette. These surveys were suddenly put a stop to by an order of the Admiralty, which both Sir F. Beaufort and Admiral Smyth considered to be an "inscrutable measure," and a heavy blow inflicted on this important branch of the naval service.

Whilst compiling about one hundred charts and plans of the Grecian Archipelago—as interesting to the antiquary and historian as they are valuable to the navigator—Captain Graves had the singular merit of attracting to his little ship the *Beacon*, as his friend and companion, that young naturalist Edward Forbes, then rising in the estimation of his contemporaries, and who, after passing nearly two years in dredging the Ægean Sea, and in developing the conditions of life and habits of submarine animals at various depths, threw a broad new light upon geological science. The name of Graves must therefore ever be associated with that of Edward Forbes. Even to Captain Graves himself geologists are much indebted, for his numerous contributions of fossils from distant parts. That these were very important all my contemporaries are aware, and particularly those still living, who, like myself, frequented the rooms of that remarkable naturalist Charles Stokes, whose merits I attempted to place on record for the late Lord Ellesmere when he last occupied this chair. To this Society Captain Graves communicated a description of Skyes, and was the cause of our Journal being enriched by the instructive papers of his assistants Spratt and Leicester.

Ever zealous in advancing knowledge, he also afforded to Sir Charles Fellows assistance in the investigation of the antiquities of Lycia, that was duly acknowledged. Such conduct surely called

for some mark of public approbation; but although the Sultan and the King of Greece specially thanked Captain Graves for services important to humanity, this meritorious officer never received any honour from his own country. Yet who can place in comparison with the anxious, untiring energy and science displayed during life by such nautical surveys as those of Thomas Graves, the lucky accident of a few months' war service in the Baltic or the Black Sea, in which perchance the individual decorated may not have accomplished any one feat of arms? Honour then to the Governor of Malta, Sir W. Reid, whose warm sympathy was offered to the neglected and really eminent scientific sailor. The offer of the post of Superintendent of the ports of Malta was willingly accepted, and the gallant Graves had zealously performed the duties of it during three years, when he received a mortal stab from a revengeful boatman, that deprived our country of his services. His kind, open hearted and friendly disposition had long endeared him to every one who knew him, and from a personal intercourse of many years' date, I can well realize to my mind's eye the gloom, as attested by the public journals, which spread over the inhabitants of Malta on the occasion of his sad fate. Captain Graves was an old Fellow of the Royal Society, having been elected in 1826, and he was also one of the original members of the Royal Geographical Society.

Lieut.-Colonel Thomas Best JERVIS, of the Engineers, in the East India Company's Service, who died recently in London, at the age of 60, was formerly well known for his numerous important works in the Bombay Presidency, including Indian Metrology, and an elaborate treatise on the primitive universal Standard of Weights and Measures, &c. When a lieutenant, he served as the engineer in 1821 of the field force under Sir L. Smith sent to the Persian Gulf. On that occasion the Arab pirates were subdued, and the Fort of Bani-bu-Ali was taken after a vigorous resistance; operations in which he was distinguished. After repairing and putting in order many forts he was employed as a captain for ten years in making the trigonometrical survey of the Southern Konkan, a fertile country at the foot of the Ghauts. This Survey, when adjusted by the Grand Trigonometrical Survey, was incorporated into the Atlas of India, of which it formed several sheets. Fertile in resources, he devoted his residuary leisure to various useful purposes, such as building a suspension-bridge or opening out slate quarries in his Eastern abode. In 1838 he was provisionally

appointed by the Court of Directors to be Surveyor-General of India; but the appointment never really took place, as Colonel Everest had not resigned.

Colonel Jervis was the successful translator of Baron Hugel's Travels in Cashmir, and he had, I understand, translated other voyages and travels, which were never printed. Being well known for his untiring energy and his accomplishments as well as for his acquaintance with foreign languages, and having shown his foresight by the publication of a translation of the Russian map of the Crimea, and the rapid transference by the anastatic process of the Austrian military map of Turkey and the adjacent countries, he was proposed to the Treasury, and was appointed during the late war, to organize and conduct a topographical sub department of the Government, in which he prepared numerous maps and plans. He had been a Fellow of the Royal Society since the year 1838, and was a frequent contributor to the library and map office of this Society.

The Rev. Thomas HALFORD, M.A., Oxford, who died in the 68th year of his age, was a well educated gentleman, and ever desirous of promoting art and science. Being partial to the Geographical Society, and a constant attendant at our anniversaries, we shall this day mark with regret his absence from our festive board.

Sir James MEEK was a highly respected and useful public servant, who, for his administrative talents in the victualling department of the Navy Board, was knighted and honoured with the Companionship of the Bath. An old member of this Society, he served on our Council for several years, and always supported our cause as long as he remained in London. Retiring from public life, he lived during the last few years at Ilfracombe in Devonshire. Being gifted with a kind heart, and possessing the most gentle manners, Sir James Meek was much beloved by all who knew him.

James Meadows RENDEL, the celebrated engineer, has had such ample justice done to his merits by those who can best appreciate them, whether at the Royal Society, or the Institution of Civil Engineers, that it would not become me to weaken such descriptions by any panegyric of my own. The skill and decision which he displayed in many works, such as a cast-iron floating or suspension bridge, and numerous piers and docks, besides innumerable hydraulic operations, were crowned by his two great achievements, the harbours of refuge of Holyhead and Portland. These, in the estimation of his associates, are alone sufficient to hand down his name to

posterity with a Smeaton, a Rennie, and a Telford. Consulted also by various foreign Governments, he was associated with M. Lesseps and Mr. Charles Manby as one of the International Commission for the construction of the Canal of Suez. Mr. Rendel was born in 1799, was elected a Fellow of the Royal Society in 1843, and was, during two years, President of the Institution of Civil Engineers. His death, which occurred on the 21st of November, 1856, was deeply lamented by all his friends and associates.

Mr. John KENYON, who died in December last, was born in 1784 or 1785. He was, for some years, at Mr. Seyer's school, at the Fort, Bristol, several of his companions from which seminary have since won for themselves fame and honour in the service of literature and science. Amongst his favourite playmates were John Eagles, known in later days as the author of 'The Sketcher;' Broderip, the naturalist; and Andrew Crosse, the electrician. These schoolboy friendships remained through life, unclouded by a shadow.

After Mr. Kenyon quitted the University of Cambridge, he spent some time on the Continent, but, returning to England, he formed friendships with Wordsworth, Southey, and Davy. He was not only the friend of poets, but was himself a poet: having published, a few years since, at intervals, two volumes which show considerable originality, as well as a refined and cultivated taste. These poems breathe the spirit of a mild and tolerant man, wishing well to his fellow-creatures, with a liberality something more than orthodox, and seeing all things in the sunny hue of his own generous nature.

Mr. Kenyon's appreciation of genius and talent drew around him many savans and literati of the day, among whom his genial sociability seemed to have the power of amalgamating the most dissimilar natures, and of softening asperities between individuals. He was a person to whom no man volunteered to tell the worst he knew of his neighbour. He liked to see, talk, and hear of pleasant things; but he was one who feelingly shared the sorrows of his friends. His heart was ever full of true sympathy, and his hand ever ready to assist those who required his aid. In one year he spent four thousand pounds in acts of *private* charity!

Mr. Kenyon died on the 2nd of December, 1856. All those who knew him well, feel what they have lost; those who knew him but slightly will not soon forget his ever kind and bland manners. By his noble and generous will he divided his large fortune amongst

his numerous living friends, and the children of such of his old friends who had before him "gone to the many."

Vice-Admiral Lord RADSTOCK, C.B., has very recently been taken from us. Born in 1786, and entering into the profession of his father, the well-known admiral, who won the battle off Lagos in 1797. he distinguished himself in several engagements in the Mediterranean, in the last as Captain Waldegrave, and off the Italian coast, in destroying the batteries at the mouth of the Rhone. He was afterwards made naval aide-de-camp to the Queen. Although the death of Lord Radstock seemed appallingly sudden to those who had seen him sitting at the General Meeting of the London University a few days before, yet others who, like myself, had watched with grief the rapid change in his health during the preceding months, were not unprepared for the sad event. Valuing Lord Radstock highly for his personal qualities, I can truly say that the death of this brave officer and excellent man created a very general feeling of real sorrow, as deep among his friends and acquaintances as in all those public bodies, and numerous charitable institutions, in the welfare of which he took a warm interest.

Robert ANDERSON, Surgeon. R.N., who died in June, 1856, at the early age of 38. was born in the parish of Fettercairn, Kincardineshire. Receiving his early education at the Academy of Montrose, his medical studies were carried on and completed in the University of Edinburgh. Entering the Royal Navy, as an assistant-surgeon, in 1838, he served successively in the Royal Adelaide, the Princess Charlotte flag-ship, and in the Powerful, being on board the last-mentioned ship when commanded by Sir C. Napier at the siege of Acre and during other operations on the coast of Syria. Afterwards serving upon the East India and China station in the *Agincourt*, *Spiteful*, and *Dædalus*, and obtaining the rank of surgeon, he again passed to the *Spiteful*, in which he returned from India in 1847. In the following year Mr. Anderson was appointed surgeon of H. M. S. Investigator, Captain Bird, which shared in the expedition of Sir James Clark Ross to the Arctic Seas; and in 1849. he was again selected for similar service as surgeon of H.M.S. *Enterprise*, Capt. Collinson, in which he continued to serve till the return of that vessel to England. With the exception of scarcely 9 months. Mr. Anderson was constantly employed afloat for a period of nearly 17 years, of which 7 were spent in Arctic service.

Besides writing extended journals, Mr. Anderson made a large

collection of specimens illustrative of the natural history of the Arctic regions. Of this collection the zoological specimens were deposited in the British Museum, the dried plants being sent to Sir William Jackson Hooker at Kew, and the fossil remains to the Geological Society.

Frank, generous, and warm-hearted, esteemed alike for his professional abilities, scientific attainments, and private worth, his conduct through life exemplified a high-toned sense of honour and manly independence of character, and his premature death has caused real sorrow to his numerous friends.

Charles ELLIOTT, Esq., who died in May, 1856, at the age of 80, was a sagacious and esteemed Civil Servant of the East India Company. He always strove to promote the advancement of knowledge and geographical science, and was much beloved for his social qualities. Acting in various important capacities in Hindostan, he eventually rose to be the senior member of the Board of Revenue in Bengal, and agent to the Governor-General in the western provinces, in which capacity he proved a worthy successor of Sir Charles, afterwards Lord, Metcalfe.

Mr. Elliott had been, since the year 1832, a Fellow of the Royal Society, by whose members, as by our own, he was much esteemed; but it is specially in the Asiatic Society, of which he had been some years the Treasurer, that his loss is most felt, as evidenced by the Annual Report of that body, in which the soundness of his judgment, the integrity of his character, and the discrimination of his taste are justly extolled.

Lewis H. J. TAYLOR was a praiseworthy person, who formerly serving as a purser in the Royal Navy, became Secretary of the United Service Institution, and continued to carry on the business of our neighbouring establishment for many years with much efficiency and most obliging manners.

W. H. PEPYS, a native of this metropolis, was born in 1775. He succeeded to his father's trade in the Poultry as cutler and maker of surgical instruments. From his earliest years he devoted himself zealously, disinterestedly, and uninterruptedly to the advancement of science. It is now exactly half a century since Allen and Pepys communicated to the Royal Society the memorable experiment by which the identity of diamond with other known forms of the element carbon was confirmed. It was, however, as the contriver of ingenious modifications of chemical apparatus, that Mr. Pepys rendered the most signal service to scientific men.

During every phase of the rapid progress of chemistry, the gas-holder which bears his name, has maintained its place as well in the lecture-theatre, as in the laboratory of research. I have reason to believe that the arrangement of the magnificent voltaic battery, by which Davy decomposed the alkalis at the Royal Institution, was, more or less, confided to Mr. Pepys: hence, probably, originated the friendly regard in which he was held by that eminent philosopher. In the *Philosophical Transactions* for 1823 there is a description of a voltaic apparatus, consisting of two elements only, for electro-magnetic research, made under Mr. Pepys' directions for the London Institution.

Let me add that Mr. Pepys was always anxious to associate with those who, like himself, desired to cultivate science for its own sake. He joined our Society at its commencement. He was one of the early promoters of the London Institution, and an original Member of the Geological Society. He was also a Member, and an office-bearer in the Royal Institution, where he received the honour of one of the ten Gold Medals awarded for chemical discovery. He died at his house, Earl's Terrace, Kensington, August 17th, 1856, aged 81.

A Foreign Associate whose loss we have to deplore during the past year is Baron von HAMMER-PURGSTALL, the distinguished Oriental scholar, poet, and historian. Attracted from his earliest childhood towards the East and Eastern literature, no one has done more good, in spreading the knowledge of Oriental History and Literature amongst the literary circles of Western Europe, than the learned author of the '*History of the Ottoman Empire.*' Born at Gratz, in Styria, in 1774, he entered the Oriental Academy at Vienna in 1788, where he attracted the attention of the celebrated Jenisch, whom he assisted in the preparation of his edition of '*Meninski's Lexicon.*' He subsequently entered the Austrian diplomatic service as Interpreter at Constantinople, he then served in the same capacity to the British army during Abercrombie's campaign, and after acting as Attaché to the Austrian Embassy at Constantinople and as Consul in Moldavia, he was appointed Interpreter to the Vienna Chancery in 1811. From this time devotion to Oriental Literature became the leading object of his laborious life; and when he subsequently quitted the public service he pursued his favourite studies on his estates in Styria.

Some opinion of his active energy may be formed from the long

list of works which he published,* in which great research, combined with much originality, is one of the most characteristic features. But the work which has formed the basis of his European reputation was undoubtedly his 'History of the Ottoman Empire,' by far the most important work yet written on this interesting subject, though even here he has been accused of an undue bias toward the House of Austria, a bias, however, as pardonable as it is natural in such a case.

He died at Vienna on the 16th of November, 1856, in his 83rd year. His monument, which he had himself prepared forty years before his death, is placed at his own request in the cemetery of Weidling, near Kloster Neuburg. In a spirit of humble piety he addressed a letter to our Secretary not long ago, in which, after announcing the formation of a Geographical Society at Vienna and presenting to this Society a copy of his last works, he adds:—"As there is little probability that I shall be long enough in life to see the end of the printing of this work, I mention the circumstance that you may claim after my death the continuation of the work from the Imperial Academy."

J. F. WAHLBERG, the Swedish Explorer and Naturalist, already known for his travels in South Africa in 1843, was killed by an elephant on the 6th of March, 1856, on the border of a river about 200 miles N.E. of Lake Ngami, probably the River Tamunakle of Livingstone. His collections have been sent to the Cape. His companion Mr. Green had ascended the Tioghe as far as Libebe, 100 miles to the south of which he was forced to leave his boat on account of the rapids.

M. WAHLBERG, who was a Member of the Royal Academy of Sciences of Stockholm, had returned to his native land in 1844, but the indomitable desire to make new discoveries in natural history led him to revisit Southern Africa in 1854. Endowed with profound knowledge in zoology and botany, M. Wahlberg, being specially characterized by a modest and unassuming manner, was truly

* Amongst his numerous publications the most important are, 'Encyclopædic View of Oriental Science,' 1804; 'Glance at Turkish Literature,' 1816; 'History of Persian Belles Lettres,' 1818; 'History of the Assassins,' 1818; 'History of the Ottoman Empire,' 1827-1834; 'History of Ottoman Poetry,' 1830-1838; 'The Mongols in Russia,' 1840; 'Geography of Arabia,' 1840; 'The Mongols in Persia,' 1843; 'Treatise on the Seals of the Arabs, Persians, and Turks,' 1849; 'Report on Renaud's French Translation of Abulfeda's Geography,' 1849; 'Report on Pince' and Lithographic Works published at Constantinople during the Years 1845-1848.'

beloved by all those who knew him, and his death at the premature age of forty-four, occasioned general sorrow throughout Sweden.

Lastly, let me close this enumeration of our deceased friends by alluding to our late honorary Foreign Member, Dr. Elisha Kent KANE; although no language of mine can express the deep regret I feel at the premature decease of this heroic young Arctic explorer.

The son of a distinguished Judge of Pennsylvania, he was born in 1822, and educated at the Universities of Virginia and Pennsylvania. Accompanying as a medical officer the first American Expedition to China, he explored the Philippines, chiefly on foot, and made maps of those islands. Having survived severe attacks of fever he examined the volcanic region of Java, and was the first to descend into the great crater of Tael and make a sketch of its interior. In this early effort, the zeal of the youth seemed to have no bounds, for he was lowered upwards of 700 feet by a bamboo rope, and from the effects of the strong sulphurous fumes was senseless when hauled up to the rim of the orifice. He not only traversed India and Ceylon, but also visited Egypt, where he was associated with Lepsius; but unfortunately lost his notes and papers, and being stricken with the plague, narrowly escaped death. Subsequently he sailed to the west coast of Africa, examined the slave factories, and proposed to make a journey to Abomey, which he never accomplished, owing to a violent fever, from which he suffered during his life—a fact which is not to be passed over without the comment, that his Arctic sufferings were *not* the cause of his decease; for he returned from his last perilous exploits in perfect health. His bravery, ability, and generosity were next conspicuously elicited in the Mexican war; and even then he endeavoured to find time to make barometrical observations on the height of Popocatepetl. Having volunteered his services as surgeon to the first American expedition in search of Franklin, he published a narrative of this voyage under De Haven. Finally, he performed those extraordinary researches beyond the head of Baffin Bay, which obtained for him our Gold Medal at the last anniversary and the unqualified admiration of all geographers. At that time, however, we had not perused those thrilling pages, which have since brought to our mind's eye the unparalleled combination of genius, with patient endurance and fortitude, which enabled this young American to save the lives of his associates. With what simplicity, what fervour, what eloquence, and what truth has he described the sufferings and perils from which he extricated his ice-bound crew! You must, indeed, all agree

with me, that in the whole series of literature there is no work, which more feelingly develops the struggles of humanity under the most intense sufferings, or which demonstrates more strikingly, how the most appalling difficulties can be overcome by the union of a firm resolve with the never-failing resources of a bright intellect. In all these heart-rending pages there is no passage which comes more home to the Englishmen who are still advocating the search for the relics of the Erebus and Terror, than that in which, after judging from the experience of his own companions, how men of our lineage may be brought to bear intense cold and trial on their existence among the Esquimaux, he thus soliloquises — "My mind never realizes the complete catastrophe, the destruction of all Franklin's crews. I picture these to myself broken into detachments, and my mind fixes itself on one little group of some thirty, who have found the open spot of some tidal eddy, and under the teachings of an Esquimaux, or perhaps one of their own Greenland whalers, have set bravely to work and trapped the fox, speared the bear, and killed the seal, the walrus, and the whale.—*I think of them ever with hope. I sicken not to be able to reach them.*"* These generous and lofty sentiments, as I shall afterwards point out in dwelling on Lady Franklin's final search, are shared by that distinguished Arctic officer, our associate Captain Hartstene, of the United States' Navy; and they have justly awakened the hope in the breasts of many of my countrymen as well as myself, that some of the fine young fellows who sailed with Franklin may still be alive—the conviction that they must, for the honour of our country, be sought for, as well as the débris and records of the Erebus and Terror.

It was, indeed, a subject of great regret to me that when Dr. Kane visited England last autumn, this metropolis (as is usual at that season) was deserted by many of those persons who most valued his character, and that none of those attentions could then be paid to him which, had his stay amongst us been prolonged, would doubtless have been showered upon him from the Sovereign downwards. But alas! the stroke of death was already upon him, and when I first shook his hand, I at once saw that his eagle-eye beamed forth from a wasted and all but expiring body. As geographers we were not, however, remiss in our endeavours to honour him: and although his malady prevented his attendance at our apartments to receive our heartiest welcome, I then proposed

* Kane's Arctic Expedition, vol. i. pp. 243-6.

the Resolution expressive of our admiration of his conduct, which you passed with acclamation, and which was communicated to him personally by our lamented late President, Admiral Beechey.* Hurrying away to the Havannah to seek a milder clime, Dr. Kane there terminated his noble and brilliant career. If on the subject of Arctic research our meed of praise has justly been offered to such pure philanthropists as Grinnell and Peabody, let me say that there never has been an occasion in which the people of the United States have done greater honour to themselves than by the manner in which they sought to testify their respect for the memory of their young hero Kane, when his mortal remains reached his native city of Philadelphia. "The long procession of mourners (as is recorded in the 'Philadelphia Evening Journal' of March 12), the crowded yet silent streets through which they move, the roll of muffled drums, the booming of minute guns, the tolling of passing bells, the craped flags at half mast, and all the solemn pageantry of the scene proclaim that it is no ordinary occasion which has called forth these impressive demonstrations of public respect." Agreeing entirely with this eloquent writer, that few men have ever lived, who have earned a better title to the esteem and admiration of his race, and also warmly commending to your notice the sentiment proceeding from a great commercial city of our kinsmen, "that we are not to look to the mere *utilitarian* value of Dr. Kane's labours and adventures, to the claim for that bright and unfading glory which must ever surround his name," let me say that, by re-echoing the voice of America on this occasion, England can best cherish the memory of one who dared and did such heroic deeds to rescue our lost navigators.

Having thus imperfectly glanced at the feats which our deceased Medallist had accomplished in the short life-time of thirty-five years under the impulses of humanity and science, I cannot better sum up his virtues than in the words of the divine who preached his funeral sermon†—"He has traversed the planet in its most inaccessible places, has gathered here and there a laurel from every walk of physical research in which he strayed, has gone into the thick of perilous adventure, abstracting in the spirit of philosophy, yet seeing and loving in the spirit of poesy, has returned to invest the very story of his escape with the charms of literature and art, and dying at length in the morning of his fame, is now lamented with mingled affection and pride by his country and the world."

* See Geographical Proceedings, Jan. 1856.

† The Rev. C. W. Shields.

GEOGRAPHICAL PROGRESS.

Admiralty Surveys.—The Maritime Surveys of Britain have been steadily carried forward during the past year. I am informed by Captain Washington, R.N., Hydrographer to the Navy, the worthy successor of Admiral Sir F. Beaufort, that twenty different surveying parties are in active service, about one-half of which are employed on our own coasts, the remainder in the Colonies, the Mediterranean, the River Plate, the South-western Pacific, and the coast of China.

England.—To begin with operations at home. Sanitary measures connected with the metropolis have necessitated a fresh survey of the upper portion of the River Thames. At the instance of the First Commissioner of Works, Commanders Burstal and Cudlip, in August last, began a minute survey of the river from London Bridge upwards to Putney, a distance of about $7\frac{1}{2}$ miles, running again the identical lines of sections, at about 700 feet apart, taken by Giles in 1823, in order to institute a comparison as to the change in the bed of the river. These soundings have been laid down on the sheets of the Ordnance Survey of London on a scale of 60 inches to a statute mile, a scale sufficiently large to show minutely every feature.

The result, as shown in Commander Burstal's Report and Transverse Sections, is that since the year 1823 the average deepening of the bed has been about 4 feet from Putney to Westminster Bridge, and about 6 feet from Westminster to London Bridge; but this average by no means shows the extent of the scour consequent on the removal of Old London Bridge in 1832, as, for instance, near the Grosvenor Canal there are places where the deepening has been 13 feet; at Westminster Bridge 10 feet; at Hungerford $11\frac{1}{2}$ feet; and above Southwark Bridge 14 feet. These figures are highly instructive as showing the improvement which might be expected in other rivers in this country, if the old fashioned bridges which now act as dams were removed, as in the Tyne, the Slaney, and the Liffey, and if Newcastle, Wexford, and Cork Bridges were rebuilt with proper openings.

The sounding of the upper part of the Thames will be continued in sections of 150 feet apart from Putney to near the Thames Tunnel, about $1\frac{1}{2}$ miles below London Bridge. At that point it has been taken up by Commander Cudlip, who is now engaged sounding Greenwich, Blackwall, and Woolwich Reaches, the plans of which, it may be hoped, will form the foundation for a systematic and ex-

tensive dredging of all the upper part of the river so soon as the Thames Conservancy Board can be brought into action.

On the East Coast of England, Mr. E. K. Calver has revised all the charts during the past year, and inserted the changes that have taken place during the last ten years, and especially in the frequented anchorages of Yarmouth and Lowestoft Roads. He has also prepared the Sailing Directions for this coast and for the opposite shore of Belgium, Holland, and Jutland up to the Skaw, which will form Parts III. and IV. of the 'North Sea Pilot' now in preparation.

On the South Coast of England, the surveying party under Commander Cox and Messrs. Usborne and Davis have just completed a careful examination of Plymouth Sound, whence it appears that that well-known roadstead has not silted up in any appreciable degree since the breakwater was placed across its entrance—an interval of five and forty years—the first stone having been deposited in August, 1812.

In Cornwall, Captain Williams and Mr. Wells have completed the survey of the Fowey River, from Lostwithiel to the sea, and a portion of the coast from Fowey to the Dodman.

In the Bristol Channel, Commander Aldridge and Mr. Hall have surveyed Caddy and Tenby Roads, where they have discovered and mapped several new rocks and shoals not before pointed out.

Scotland.—In the Frith of Forth, Lieut. Thomas and Mr. Sutton have surveyed the coast of Haddington by Dunbar and St. Abb's Head to Coldingham, and have completed the outer soundings to the eastward of the Isle of May, which mark the approach to this extensive estuary.

Farther north, a detailed plan of the Bay and Harbour of Wick and Pulteney Town has recently been published at the Admiralty, preparatory, we trust, to the laying out of a Harbour of Refuge on that exposed coast, where in an easterly gale the 1000 herring-boats that annually fish out of Wick have no shelter to run for. The numbers of valuable lives at stake in these important fisheries imperatively demand that a suitable harbour in the most appropriate spot should be constructed without further loss of time.*

The Sailing Directions for the Orkneys and Shetland, originally drawn up by the late Commander Thomas, and revised and corrected by Mr. E. K. Calver, have been published during the past year, and

* A subject of considerable importance to physical geographers as connected with the harbour of Wick will presently be discussed (*see* Physical Geography).

they form Part I. of the four parts of the 'North Sea Pilot,' the whole of which work will, we trust, be in the hands of the mariner before the close of the present year.

On the north-west coast of Scotland, Commander Wood has surveyed a small portion of Skye, while Mr. Jeffery has mapped Loch Nevis. Several detached Charts also of these coasts have been published during the past year, as lochs Broom, Ewe, Hourn, Gairloch, Edrachilles Bay, including the lochs, Raasay and Inner Sound, Sounds of Seil, Mull, Sleat and Kyle Rhea.

In Argyleshire, Commanders Bedford and Creyke, and Mr. Bouchier, have added to our knowledge of the north shores of the isle of Mull, and have re-examined Oban bay.

In the Hebrides some soundings off the isle of Lewis have been obtained by Captain Otter and his staff in the Porcupine; and during the present season a survey of the Sound of Harris will, it is hoped, prove to the mariner whether, in case of need, he may safely run for that strait.

Ireland.—On the north-eastern shore of Ireland, Messrs. Hoskyn, Aird, and Yule, have completed the examination of Belfast Harbour, and made patent the improvements that public spirit, combined with good engineering, has within the last few years effected in that port. They have also mapped a portion of the coast of Antrim, from Garrow Point to Ballygally Head, the fine natural harbour of Lough Lorne, and the artificial packet-station of Donaghadee.

In Wexford, on the south-eastern coast, Captain Frazer and Lieut. Bullock have re-examined the channels and banks at the entrance of that harbour, where some remarkable changes have taken place, and made a detailed survey of the River Slaney up to the town of Enniscorthy, preparatory, we trust, to some extensive improvements in the channel—a measure which could not fail to be attended with corresponding benefit to the fertile country which that river drains.

In Donegal, on the north-west coast, Captain Bedford and Lieut. Horner have completed elaborate plans of Sheep Haven and Mulross Bay. By permission of the Admiralty, these plans have been exhibited at our evening meetings, and I am sure you will all willingly join with me in acknowledging the apparent fidelity and beauty with which the features of these natural inlets have been portrayed.

In Kerry, on the south-western coast, Commanders Beechey and Edey, with Mr. W. B. Calver, have mapped a portion of Tralee and Brandon bays, while Mr. McDougall has surveyed Dingle and Ventry harbours, which lie on the southern side of the same bold projecting

peninsula of Kerry, and which, having twice examined myself, I can testify to be the most interesting part of Ireland, in showing certain relations of the Silurian to the Devonian rocks, which can nowhere else be seen in the sister island.

The neighbourhood of this immediate coast, on the south side of Dingle Bay, is about to become a site of much interest and importance, the small island of Valentia having been selected as the Eastern or European terminus of that Atlantic Electric Telegraph Cable, on which I shall presently enlarge, as destined to unite the two continents in stricter bonds of amity and good fellowship.

It must interest my hearers to know that Lieut. Dayman, R.N., who was a companion of Sir James Ross in his voyage to the Antarctic regions, will leave England in a few days in command of the Cyclops steamer, to carry a line of deep sea soundings across the Atlantic, from Valentia to Trinity Bay in Newfoundland. The vessel is furnished with some 20,000 fathoms of line of different sizes, a portion being of silk, with an abundant supply of sounding machines, and a steam-engine on deck on purpose to heave in and reel up the line, and we may fairly hope, ere long, to have a second continuous line of soundings across the Atlantic, and know the nature of the bed on which the Telegraph Cable will have to repose.

With the authority of our Council, I took advantage of the announcement of this expedition, so deeply interesting to naturalists, and suggested to the Hydrographer that, the opportunity being one which might never recur of obtaining an accurate acquaintance with submarine life at great depths, a competent naturalist might be allowed to accompany the survey, or that in any case the medical officer of the Cyclops might be so instructed as to record accurately the phenomena.

Black Sea.—In quitting our home for foreign shores, the survey of the Delta of the Danube claims precedence, and is entitled, in the opinion of my eminent friend Captain Washington, to our warmest acknowledgments for the admirable manner in which it has been carried out by Lieut. Wilkinson, R.N., under the orders of Captain Spratt, R.N., C.B., whose report on Fidonisi, or Serpent Island, has been communicated to the Society by the Admiralty. This recent survey of the streams which form the delta of the Danube is comprised in several charts, filled almost to overflowing with soundings of the three principal branches, Ochákov or Kilia to the north, the Súlina in the centre, and the St. George or Khedriliiz to the south. These plans are now lying on the table before us, and

they bespeak for themselves our admiration of the beauty of their execution and of the unflinching perseverance with which these services were accomplished in the short period of a few months of last autumn.

Sea of Azov.—During the present session, we have received from our associate, Captain Sherard Osborn, R.N. (so honourably known to us by his Arctic explorations and writings), an interesting communication on the geography of the Sea of Azov, the Putrid Sea, and the adjacent coasts, with remarks on their commercial capabilities. As the hydrographical features of this area are peculiarly deserving of notice, I naturally treat of them under the head of the British Naval Surveys. In no part deeper than 40 feet, the centre of this sea forms a flat basin 55 miles in extent from east to west, and 35 from north to south, with an inclination from the edge of this level to the coast of about a foot per mile, increasing somewhat in abruptness as the water shallows.

The sandy spits, which are so remarkable, and are attributed by the author to volcanic action, afford a shelter against easterly winds, but there is no protection in any part of the sea against those from the west. When this communication was read, I confirmed, from personal observation, the accuracy of Captain Osborn's remarks upon the rapid accumulation of sand on these spits; and the fact of their being precipitous on the east side and shelving on the west is a good addition to our knowledge. There can be no doubt, however, that the base of some of them, near the ports, consists of knolls formed by the discharge of ballast from trading-vessels, thus forming nuclei for fresh alluvial deposits, which, after a short time, become connected together; and unless means be adopted for checking this system of accumulation, the Sea will, before long, be hardly navigable in certain places.

The assertion of M. Taillout de Maigny, that there is little current in the Sea of Azov, is shown by Captain Osborn to be an error; the existence of currents being indicated, not only by the influence of the winds on the motion of the water, but also being plainly manifested by the outflow from the delta of the Don, the Sivash, and the rivers between Taman and Kamisheva. The physical features of the Spit of Arabat, and of the Sivash or Putrid Sea, are described from observations made, under very difficult circumstances, during the late war.

Mediterranean and Aegean.—On a recent route from Malta to the Dardanelles, Captain Spratt had an opportunity of obtaining a

line of deep sea soundings between that island and Candia, in which the greatest depth was 2170 fathoms. The section is very striking; for a distance of 50 miles to the eastward of Malta the depth does not exceed 100 fathoms, after which it drops almost suddenly to 1500 and 2000 fathoms, and continues near that level *below* the surface of the sea until within 20 miles of the east end of Candia or Crete, where the White Mountains and Mount Ida rise up to a nearly equal height *above* the level of the sea. Between Crete and the Dardanelles the greatest depth is 1110 fathoms.

Africa.—On the North Coast of Egypt, Commander Mansell in the *Tartarus*, with his assistants, Lieut. Brooker and Mr. Skead, have completed a survey of the coast from Damietta eastward to El Araish, an admirable plan of the port of Alexandria, and a survey of the bay of Suez, a place daily becoming of more importance as our direct mail communication extends to India, China, and Australia.

Taking advantage of fine weather and a calm sea, Captain Mansell has lately run a line of soundings between Alexandria and the island of Rhodes. From the coast of Egypt the depths gradually increase until at 70 miles off they reach 1000 fathoms, at 110 miles 1600 fathoms, which is the maximum depth of this portion of the basin of the Levant. The above soundings are of great interest to the geologist as well as the geographer, and do much credit to the officers who, overcoming many difficulties, have succeeded in carrying them out.

While on this subject, I should mention that, in October, 1856 Messrs. Delamanche and Ploix, Ingénieurs Hydrographes of the French Imperial Marine, carried a line of soundings across the Mediterranean between Port Vendres in France to Algiers, in which the greatest depth was about the same as in the Levant, namely 1600 fathoms.

South Africa.—In the Cape Colony the only addition we have to record is the completion by Mr. Francis Skead of the survey of Port Natal, begun by Lieut. Dayman, R.N., in 1855. I cannot here but repeat the words of my predecessor in this Chair, that both the land survey of the colony and that of the coasts ought to be pressed forward. Every year that they are delayed bars the progress of the settlers, hinders the development of the resources of the district, and is attended with loss to the colonial exchequer.

China Seas.—In the last anniversary Address a hope was expressed that Captain Bate, the surveyor of the island of Paláwan, might be more usefully employed in China than in merely commanding a

cruizing ship. It is gratifying to be able to state, that a thoroughly equipped surveying vessel, the *Actæon*, accompanied by a small steam tender the *Dove*, under command of Lieut. Bullock, has sailed for those seas, and as soon as the present unfortunate differences with China are settled, Captain Bate will resume his survey on such parts of the coast as most require it. In the meantime, Messrs. Richards and Inskip in the *Saracen* will proceed forthwith to make a detailed survey of the dangerous shoal *As Pratas* (lying only 60 leagues to the E.S.E. of our own colony at Hong Kong), with a view to the construction of a lighthouse upon that extensive coral reef which has caused the wreck of so many vessels.

Siam.—The chart of the Gulf of Siam has been materially improved during the past year. Messrs. Richards and Inskip have visited Bangkok, where they experienced great attention and assistance from the enlightened ruler of that country; they have rectified the positions of several islands and of many of the headlands and capes on the western as well as on the eastern shore of the gulf.

Tartary.—Farther north on the coast of Tartary the officers of one of our cruizing vessels, the *Barracouta*, have examined a harbour, which they have named after that ship, and in which the Russian frigate *Pallas* had taken refuge. This capacious harbour is the same as that called *Imperadorski Gavan*, or *Port Imperial*, by the Russians, and lies about 130 miles south of *Castries Bay*.

In the Admiralty chart of these regions the whole course of the *Amûr* has been laid down from the astronomical observations made by *Peschurof* in 1855, which render the river quite a new feature in our maps. The details of these observations are given in the '*Morskoi Sbornik*,' or Russian Nautical Magazine, for March and May, 1857. They are also to be found in that excellent geographical periodical, '*Mittheilungen*,' edited by Dr. A. Petermann at Gotha.

New Zealand.—The publication of the detailed charts of the coasts and harbours of this group of islands advances rapidly; the past year has produced four coast charts, on the scale of 4 miles to an inch, and 11 plans of harbours and rivers, including *Auckland*, *Waitemata*, *Taupanaa*, *Whangaroa*, *Hokianga*, &c., being a portion of the ten years' labour of Captains *Stokes* and *Drury*, with Messrs. G. Richards, Frederick J. O. Evans, J. H. Kerr, &c., and we trust that before the close of the next year every item of information we possess of these islands will be in the hands of the mariner.

Pacific Ocean.—Captain *Denham* in the *Herald* continues his

useful labours in the south-western Pacific. During the past year he has surveyed several islands of the Fiji group, as Angau, Matuka, Mbatiki, Moala, and has swept from the charts the imaginary Underwood and Rosaretta reefs. Assistant-Surgeon Macdonald of the *Herald* has made a journey into the interior of the island *Uti Levu*, which, with a track chart of the route, has been communicated to the Society by the Admiralty. Various views of headlands and characteristic sketches of the scenery and of the natives have been made by Mr. Glen Wilson, artist to the expedition.

A chart of the Pacific Ocean, in 12 sheets, on the scale of $\frac{1}{100}$ ths of an inch to a degree, has recently been published by the Admiralty, in which the curves of equal variation have been carefully laid down for the year 1855, by Mr. Frederick J. O. Evans, chief of the Compass Observatory. The whole forms a valuable contribution to hydrography, and physical geography.

America.—Pursuing our imaginary eastern route, we have the gratification to announce that a well organized expedition, under the command of Captain George Richards, R.N., favourably known as a fellow-labourer with Captain Stokes in the survey of New Zealand, has sailed for Vancouver Island, to determine, in conjunction with the United States Commissioners, the boundary, as laid down by treaty, between the British and American possessions. This expedition cannot but be productive of a good harvest of geographical information.

In the Rio de la Plata, Lieut. Sidney, with slight means at his command, has fixed the position of the north edge of the English Bank, lying some 10 miles south of Monte Video; he has completed a detailed plan of the river and outer roadstead of Buenos Ayres, and has partially examined the lower course of the Uruguay.

On the coast of Brazil, Lieut. Parish, R.N., has furnished plans of several small harbours and otherwise improved our charts, while a more complete Sailing Directory, founded on the labours of Baron Roussin, is in course of preparation by Rear-Admiral FitzRoy.

West Indies.—The additions to geography in the West Indies consist in a survey of the island of Santa Cruz, and the harbour of Christianstadt, by Messrs. Parsons and Dillon; a re-examination of the harbour of Grey Town by Mr. Scott, master of H.M.S. *Impérieuse*, and some new coral patches discovered among the Pearl Cays.

Nova Scotia.—In the Bay of Fundy, Commander Shortland, with Lieut. Scott and Mr. Scarnell, has completed the soundings in the

vicinity of the Grand Manan islands at the entrance of the Bay, and has mapped a further portion of the south-western coast of Nova Scotia.

Gulf of St. Lawrence.—Rear-Admiral Bayfield, in succeeding to his flag, retires from the command of the survey of the Gulf and River St. Lawrence, on which extensive work he has been engaged upwards of a quarter of a century. It has fallen to the lot of few officers to originate and bring to a close, after so many years, so extended and laborious a work, where the Surveyor had to contend with a rigorous climate in winter and fogs in the spring and autumn, leaving but a short season in which outdoor work could be executed. It has, however, been done in a masterly manner, as more than 100 published charts and plans, complete sailing directions, and a valuable table of Geographical Positions connected with Quebec, Halifax, and Boston, most fully testify. I am sure you will all join cordially with me in wishing many years of honourable repose to the gallant Admiral whose labours have bestowed so valuable a boon on the mariner, and whose previous observations, let me add, on various glacial phenomena, including the transport of blocks by the ices of the St. Lawrence, have been of signal service to geological science.

Commander Orlebar, the former chief assistant, succeeds to the charge of the survey, which will be continued along the eastern shores of the peninsula of Nova Scotia. •

Ordnance Survey of Great Britain.—No change, as I am informed by the able superintendent of the Ordnance Map Office, Lieut.-Colonel James, has been made in the orders relative to the survey during the last year, and the progress in the north of England and Scotland for the twelve months ending on the 31st of March has been very great, amounting to 1,394,409 acres, finished in every respect for publication. •

The publication of the following counties has been finished within the last year, viz. Yorkshire, Fifeshire, Kinross, and Linlithgowshire.

The publication of the following counties is in progress, viz. Durham, Ayrshire, Dumfriesshire, Renfrewshire, and Berwickshire.

The survey of the following counties has been finished during the last year, viz. Berwickshire and Selkirkshire (nearly).

The Survey is in progress in the following counties—Northumberland, Westmoreland, Lanarkshire, Roxburghshire, Forfarshire, and Perthshire.

The surveys of the large towns of Glasgow and Dundee and many others have also been finished in the last year.

An outline map of London, on the scale of 6 inches to a mile, has also been made within the last few months. The one-inch map proceeds *pari passu* with the maps on the larger scale, and great advantage is derived from the system of making all the reductions from the larger to the smaller scales by the aid of photography; indeed, Lieut.-Colonel James expects to be able to get the ground sketched on the 6-inch impressions in such a way that, when reduced by photography, the reduced drawing will be the fac-simile of what the engraver is to produce.

The general reduction in the estimates of the War Department consequent upon the return of peace, has led to the reduction of the proposed grant for the survey for the present year to the extent of 27,000*l.*, and, as a consequence, the surveying force has been reduced to the extent of 3 officers and 600 men, the parties destined for the surveys of Cumberland, Stirlingshire, and the Western Hebrides, having been broken up.

Geological Survey of the United Kingdom.—Having directed the Geological Survey of the United Kingdom during the last two years, it becomes me to say a few words on the progress of a branch of the public service so intimately connected with geographical science. The first object contemplated by my predecessor, Sir Henry de la Beche, in founding this establishment, was so to colour the Ordnance or Geographical Maps as to convey a clear idea of the rocks beneath the surface in all parts of the kingdom, and further to illustrate such structural character by coloured sections, both vertical and horizontal. In this way, not only the order and succession of the strata are delineated, but the dislocations they have undergone are marked; whilst all the rocks of igneous origin which had been intruded among them are clearly defined.

As the work advanced, it became desirable, that these surveys and sections should be accompanied by volumes explanatory of the nature of the rocks, and their mineral and zoological distinctions, with descriptions and figures of the imbedded organic remains. To render the whole subject intelligible, it further became requisite so to expose the fossils collected by the surveyors, that the public might be led to understand the *rationale* upon which the maps, sections, and descriptions were founded. Thus, a

Museum having been established on a small scale in Craig's Court, with an attached experimental chemist and laboratory, it was decided by Sir Robert Peel, at the suggestion of my lamented predecessor, that the whole establishment should be enlarged and placed on a footing similar to that on which continental countries sustain such mineral and geological surveys. Then arose the Museum in Jermyn-street, which, from its origin, was constituted to be not only the central Map Office of the Geological Survey, where the fieldwork of the surveyors is laid down, compared, and issued to the public, but also a place where the proofs of the accuracy of such works might be accessible to every one. Collocating in it specimens of the building stones, marbles, granites, &c., of various districts, this museum was rendered still more useful by the addition of a Mining Record Office, in which plans of all the mines, abandoned or existing, are, as far as practicable, registered and kept, and various statistical documents brought together to show the whole mineral produce of the country. Lastly, to attain the same position as is occupied by the mining schools of France, Germany, and other countries, it was resolved to constitute within the new building a regular School of Mines, and to carry out in it (which had nowhere been previously attempted in Britain) a complete course of instruction in those physical sciences on which geology is based. The eminence of the gentlemen with whom I am associated in Jermyn-street is the best guarantee for the success of an establishment in which youths can be thoroughly and systematically instructed in physics, mechanics, chemistry, metallurgy, mineralogy, mining, and geology.

My hearers will therefore understand, that the Jermyn-street establishment, having for its basis the geological and mineral illustration of the British isles, performs, at the same time, all the other duties to which brief allusion is here made, and must be viewed as a truly useful national undertaking.

The maps, which have been completed and published on the 1-inch scale with 6-inch horizontal sections, relate to the whole of Wales, all the south-western districts, and a great portion of the central counties of England; whilst vast tracts in Ireland have been surveyed and the information registered on maps of the 6-inch scale, and four counties published on the new 1-inch maps.

In Scotland also, progress has been made commensurate with the present force of surveyors, and there, as in Ireland, the data are

registered on the maps of the 6-inch scale, so as to be ready to be published, when the maps of the districts under review shall have been completed.

I have great satisfaction in informing you that, as the Geological Survey proceeds, the public is rapidly becoming aware of its value. The sale of the maps and sections has recently been doubled; so that, if the present demand should continue, the sale of this year will exceed 5000 sheets.

As no men of science are more directly concerned with the successful progress of the Ordnance Survey of the country, than the geologists who have to work out the subterranean phenomena upon the geographical features there laid down, so it may naturally be expected, that I should express my opinion on the *quæstio verata* which has been so much agitated in Parliament, viz. the best scale for publication.

Most persons will agree with me in what I have long contended for, that a 1-inch scale* is large enough for the purposes of a general map, and any one who doubts it should visit the Museum in Jermyn-street, and there see how vast a portion of a lofty hall is required to exhibit at one view that portion only which is geologically finished, or Wales and the half of England. But, whilst for the general purposes of the public, this scale (which is larger than that of the *published* maps of France and other foreign countries) is quite sufficient, it is my duty to say, that for several objects of the geological surveyor the 6-inch map is often of higher value. This latter scale was applied to Ireland, because it was supposed to be the smallest measure on which every essential feature of a tract, whether natural or artificial, could be laid down. It follows therefore that, in availing himself of this map, the field geologist has at hand a datum-point for every observation; particularly if it be furnished with contour lines marking the relative altitudes. In short, he can register, with an accuracy unattainable, except on such a scale, every outcrop, fold, or break of the beds; and hence,

* See Memorial resulting from a resolution which I moved at the fourth or Edinburgh Meeting of the British Association for the Advancement of Science (1834) and presented to the Chancellor of the Exchequer (now Lord Monteagle) in May, 1835. Report of the British Association, Proceedings of the Meeting, p. xxxi. This document, which showed the deplorable state of the Geography of my native country at that time, was also printed by order of the House of Commons. Subsequently, when President of this Society in 1853, I again made a strong appeal touching the neglect of Scottish Geography. — Journal of the Royal Geog. Soc., Vol. XXIII., President's Address, p. lxxxix.

independently of the advancement of the theoretical branches of his subject, and the acquirement of a sound knowledge of the substrata, he can essentially serve the purposes of the mining proprietor.

Having always held (as I still hold) that the 1-inch map is the publication which the country most requires, I am bound to record that my conviction of the utility of the 6-inch scale, for certain geological and mining purposes, is the result of an examination of the able surveys conducted on maps of that size under the guidance of Mr. J. Beete Jukes in Ireland and of Professor Ramsay in Scotland. I trust, therefore, that this larger scale will be maintained coordinately with the smaller one.*

PHYSICAL GEOGRAPHY.

Observations on the Summit of the Peak of Teneriffe.—Having spoken of the progress of practical geography at home and in our distant Naval Surveys, it becomes my agreeable duty to notice the uncommon British expedition proposed and executed last year by Professor Piazzzi Smyth, Astronomer-Royal for Scotland. During the last five years this zealous observer had endeavoured to impress upon Government, founded on his experience at the Cape of Good Hope, the eligibility of rising above the grosser stratum of our atmosphere, and had pointed to the facilities offered by the Peak of Teneriffe.

The Admiralty having finally listened to his arguments, and acceded to his moderate estimate of expense, Mr. H. Pattinson of Newcastle-on-Tyne added a powerful telescope to his instruments; and our associate Mr. Robert Stephenson generously lent him his yacht for the whole voyage out from Southampton and home; whilst several leading scientific men were glad to have their favourite experiments tried in so novel a position.

The Professor established his first station on the Peak of Teneriffe, from the 14th of July to the 20th of August, amid the old trachytic lavas of the volcano, on a spot called Guajara, 8843 feet

* I say nothing here of the Survey on the 25-inch scale which is in progress in the richer tracts of Scotland and the north of England, because it contains no delineation of the natural features of the ground. Such surveys are not to be viewed as *Maps*, but simply as cadastral plans, which many eminent public men consider to be of the highest value for the conveyance and settlement of property, &c. They are also highly useful as Fortification Plans, and for *all such purposes of detail* they are, in my opinion, preferable to any smaller surveys.

above the sea. Here, above all the clouds, except a few scirri, which appeared about one day in five, he mounted the five-feet Sheepshanks equatorial, which revealed test objects of three magnitudes smaller than it had ever shown before. In the apparatus supplied by Prof. Stokes, the increase of black lines was remarkable as the sun's zenith distance increased, and there was a growth of the red end of the spectrum. The dryness was so great, that while the country below was covered by a dense bed of clouds, the average of the dew point was 40° . The sun's radiation exceeded the graduation of the instruments, the temperature reading $180^{\circ} + x$. The moon's radiation became perfectly sensible to Mr. Gassiot's thermo multiplier, showing it to amount to one-third of the heat of a candle at the distance of 15 feet.

The second station was at Alta Vista, 10,710 feet above the sea; and there the twelve feet Pattinson equatorial was finally mounted, and by its space-penetrating power, stars of the sixteenth magnitude were easily seen, and the fractions of a second in the distance of double stars were defined. The colour also was observed. Only on one occasion could red prominences in the sun be suspected. Many other branches of observation were included, and minutely reported to the Admiralty. The breaking up of the season, after the middle of September, rendered a hasty retreat necessary, but with the conviction of a yet higher station being desirable in future, if only to get above the persecuting dust, a convenient site was marked at the height of 11,700 feet above the sea, still accessible to mules, if a little money were spent in removing some rugged blocks of lava.

Specific Gravity of Sea-water.—Our attention was recently called to the condition of the sea-water on the West Coast of Africa, when it was rendered more or less turbid to the distance of many miles from the mouth of the great river Congo or Zaire. Dr. James Campbell, F.R.G.S., of H. M. ship *Plumper*, observing this phenomenon, had the precaution to collect and send home, with a notice, various samples of sea-water taken at various distances from the shore, noting the day of collection, the latitude and longitude, and the temperature of the water and air at each of these spots. It became therefore a subject of interest to determine, if possible, the nature of the discolouring matter, and the relative specific gravity of the water in the different localities. Mr. Henry M. Witt, of the Government School of Mines, has had the goodness to examine, at my request, these samples of water, and his account of them will be published in

our next Volume. Unluckily the quantities of the water sent home were far too small to admit of rigid chemical analysis. Thus, in regard to the discolouring matter, it could only be ascertained, that it was a suspended, light, yellowish, flocculent substance, which affected the usual green colour of the sea, and is in all probability of organic (vegetable?) origin. The specific gravity, however, of the water has been determined, and the result, as will be shown in a table, confirms the observations of Mulder and Dr. John Davy, of a diminution of such gravity in sea-water as it approaches the mouths of rivers. Mr. Witt further mentions the results of other observers, and states, that after a series of experiments, in a voyage from Southampton to Bombay, MM. Adolf and Hermann Schlagintweit give 1.0277 as the mean specific gravity of the Atlantic; whilst our late member, Admiral Philip King, found the mean specific gravity of the Pacific to be 1.02648 between 10° and 40° S. lat., and 1.02613 between 40° and 60° S. lat. It would, therefore, appear probable, that whilst the density of inland seas, such as the Mediterranean, is higher than that of the broad oceans, the Atlantic will be found to have a higher specific gravity than the Pacific—a point, however, which ought to be ascertained accurately by numerous determinations of the quantity of saline matter in the waters of each of these oceans.—(See Smyth's 'Mediterranean,' p. 131.)

Permanent Effects of Winds and Currents.—By perseveringly observing the phenomena attendant upon the wear and tear of the coast of Caithness, and by pondering upon the changes that have taken place in and about the harbour of Wick, Mr. John Cleghorn, of that town, after pointing out that the south-west side of the harbour was comparatively shallow and its north-east deep, extended this observation, and found it to be true as respected other bays of the east coast of Scotland. The same observer, who had previously roused attention to the ruinous effects of the present system of fishing, in destroying the breed of herrings, and who has also written an able notice upon the formation of rock basins by the action of waves upon large stones (both derived from his own examination), was, in this case, led to believe that the natural cause affecting Wick harbour has been the long-continued prevalence of the south-west wind, which produced waves that had worn away the north-eastern headlands into precipices, and had sent back the debris by a counter or reflux current, which necessarily tended to shoal up the opposite or south-western side of the bay.

Consulting Mr. A. Keith Johnston, of Edinburgh, who had devoted many years to the accumulation of such data, Mr. Cleghorn found that his view of the prevailing south-west wind was correct, as respected all the region of the globe north of N. lat. 30° ; and hence he is naturally disposed to generalize the application of facts which are not only curious, but of value to the practical civil engineer.

An acquaintance with these data may, indeed, stimulate physical geographers to look into the general effects which have resulted from the continuance during a very long period of the same great dynamic force. In the mean time much inquiry seems to be called for. Mr. Findlay, to whom we are so much indebted for a perspicuous collection of all observations on tides and currents, whilst agreeing to the chief datum of Mr. Cleghorn, that the north-eastern shore ought, in our latitudes, to be the deepest, and the south-west shore the shallower, as due to the south-west wind governing the direction of waves which frequently have their origin at a distance of 1000 to 1800 miles from their effects, is not yet convinced of the truth of the other portion of the inference of Mr. Cleghorn, that the *débris* of the worn side is translated by a counter current towards the south-west. He reminds me, in a letter to myself, that the two circulating tidal systems, demonstrated by Dr. Whewell to exist in the North Sea, seem to explain the drift of silt from the extreme eastern shores of Britain to the Goodwin Sands and the Flemish Banks; whilst the *débris* abstracted from the south-west coast finds its way to the heads of the flow-beds in Morecambe Bay and the Straits of Dover, as shown by the tidal diagrams of Admiral Beechey.

As there is evidently conflicting evidence on this obscure part of the subject, and as the "*Flot du Fond*" of M. Emy * has been much disputed (M. Givry contending that wind affects the sea to no greater a depth than 10 fathoms, whilst Captain M. White extends that influence to 60 or 70 fathoms), we see how much additional observation is required before we can definitely judge the question with precision. If, by the examination of many other localities, the views of Mr. Cleghorn should be sustained, the generalization will be essentially serviceable in its practical application, and we may then be able to define the origin and progress of many large collections of drifted and alluvial matter, whether accumulated in

* *Du Mouvement des Eaux*, &c. Par le Colonel A. R. Emy. Paris, 1831.

remote periods, or now in progress. Once let the two points of this simple view be established, and we may extend the reasoning to those periods of change in the surface of the globe when, after the former sea-bottoms were raised up to constitute the mass of the present continents, great lines of cliff were formed in given directions, facing, as it were, broad, low tracts, covered by marine drift.

“How is it,” said a native of the country to me, when I was formerly travelling in Russia, “that the Volga has always its right bank lofty and precipitous, and its left bank low?” The question was startling; but, in examining the rocks of the mightiest of European streams, I found that it was true, though the course of the stream varied more than the fourth of a circle in the two main directions which it followed. Descending along the high or right bank from Nijny Novogorod to Kazan, I did, indeed, speculate upon its having been the ancient shore of a sea which covered the lower country to the north; and if we adopt the law that the precipitous face was the side exposed to the waves, the prevalent wind in that region, at a period antecedent to the creation of the human race, must have proceeded from the north.

This phenomenon, of a precipitous face exposed to the north, continues from the confluence of the Oka and Volga on the west, to Kazan on the east, a distance of upwards of 200 miles. Throughout that space, headlands of red sandstone and marls stand out on the right bank, opposed, in a striking manner, to the low country on the left or northern shore. Again, whilst not a single northern erratic block is to be found to the south of this portion of the Volga, the low country, at a little distance to the north, is covered by those great erratics, all of which, as geologists know, were transported by ice floes from the north, and dropped upon the bottom of a former sea. We may, therefore, naturally infer, that this east and west line of cliffs was formed during the icy period, when the great northern currents prevailed, the waves of which lashed against the hills extending from Nijny Novogorod by Tcheboksar and Sviask to Kazan.

On the other hand, when the same great stream turns abruptly to the S., and trends even to the S.S.W., a line of cliffs, still on the right bank, ranges from the bold headland of Carboniferous Limestone near Samara, and extends for about 550 miles to near Tzaritzin, facing the E.S.E. and S.E. Now, it is to be noted that, in front of this line of cliff, the low country on the opposite bank of the

stream was unquestionably occupied, at a very modern date, by a great internal sea, the desiccated shells of which, now lying on the steppes, are of the same species as those still living in the Caspian.

In these dried-up bottoms of a vaster Caspian, or what I termed "Aralo-Caspian,"* the erratic blocks of the north are no longer to be seen, and we are in a region where the right bank of the Volga has been fashioned into cliffs by the agency of winds and currents proceeding from a point of the compass very different indeed from that whence the winds and waves proceeded, when the cliffs ranging from Nijny to Kazan were formed.

In thus cautiously reasoning from data which are absolutely in our possession, and by extending the application of existing causes, we may be capable of determining the direction of the prevailing winds in different epochs of the earth's formation, and even in very remote geological periods; for many of the escarpments of ancient stratified rocks have doubtless had their prevalent direction of cliffs formed by the breakers and atmospheric agency of by-gone periods.†

Again, as we know that the ripples on the surface of the sands of the present shores indicate the direction of the waves, so when a sufficient number of observations shall have been made by Mr. Sorby and others ‡ upon the ripple-marks which have been preserved in the successive surfaces of stone, we shall be enabled to infer the direction in which the prevailing winds blew during each former geological period!

But I am now, perhaps, realizing too demonstratively for all my hearers, the truth of the incontrovertible axiom, that physical geography and geology are inseparable scientific twins.

* See 'Russia in Europe and the Ural Mountains,' p. 299, and the Geological Map, on which are noted the two points here contrasted, viz.—the southern range of the northern erratic blocks and the western boundary of the Aralo-Caspian Deposit.

† See the account of the formation of the '*Stoups of Malvern*,' in Murchison's '*Silurian System*,' p. 530; and consult Professor Ramsay's writings on this point in his '*Memoir on the Denudation of England and Wales*,' '*Memoirs of the Geological Survey of England and Wales*,' vol. i. p. 333.

‡ See '*Edinburgh Phil. Mag.*,' New Series, vol. iii., p. 112, 1856. Mr. Sorby has particularly distinguished himself by his numerous observations on this subject, and has also explained his views by ingeniously contrived instruments of his own invention.

USEFUL INVENTIONS.

The Atlantic Telegraph.—At the head of the list of useful inventions in the course of application, must unquestionably be placed the Great Atlantic Electric Telegraph.

The series of nautical observations recommended for statistical purposes, in reference to the meteorology and physical geography of the sea, by the Maritime Congress held in Brussels in 1853, followed by the co-operation therein of the mercantile and governmental navies of the countries there represented; the subsequent writings and investigations of Lieut. Maury, U.S.N., founded largely upon those observations, and the soundings of Lieut. Berryman and others in the Atlantic Ocean, have determined the path which seems at present to be the only practicable one for successfully submerging a telegraphic cable beneath that sea, and so uniting Britain and America.

This path would appear to lie, in a straight line, nearly due east and west, between 48° and 55° N. latitude from the coast of Ireland to that of Newfoundland, along the course of which the depth of water is believed to be nowhere greater than 12,000 feet. The depth descends in gradual inclinations to that maximum, free from sudden chasms or subaqueous promontories; and upon a plateau at the bottom of the sea there is formed an agglomeration by the constant current of the Gulf Stream, which proves, under microscopic observation, to be composed of the minute shells of Foraminifera and Diatomacea, and which, it is believed, will, in time, form a complete incrustation over the outer metal of the telegraphic cable.

It is singular that in no other part of the Atlantic than across this broad belt do conditions exist which, according to our present knowledge, would justify an attempt involving so much scientific interest, and so large a cost, as that of such a submergence of telegraphic wires.

To the southward of the Great Bank of Newfoundland, the bottom of the ocean suddenly recedes into vast and uncertain depths, due to some great former depression of the earth's crust, in many places unfathomed, which leave a channel for the Gulf Stream, along the whole of its course to the northward of the Gulf of Mexico. These depths continue, with intervals of abrupt and almost precipitous

breaks of elevation and depression, for half the distance eastward from the seaboard of the United States towards the coast of Portugal, and for as great a length in a north-easterly direction towards the coasts of England and Ireland. They are succeeded, in a direction due east, by the region of the Azores, where submarine volcanic action is constant, and where, owing to the deep soundings inshore and the absence of suitable bays or coasts in those islands, the secure landing and subsequent maintenance of the telegraphic cable would be very difficult and problematical.

With regard to the distance, it may be mentioned that a line from the nearest point on the coast of the United States, if taken direct, without touching at the Azores, would consume nearly 4000 miles of cable, and absorb considerably more than half a million of capital, and that, when laid, it would, in all probability, be soon abraded and destroyed, owing to the many and deep valleys it would necessarily have to bridge over along its course; while its great length would increase the difficulties and delay experienced in transmitting a current of electricity through very long circuits. Moreover, if carried by way of the Azores, using one of the islands as a relay station, the physical inequalities of the bed of the ocean would in no way be lessened in the western part of that route, and it would have the disadvantage of passing over a broader submarine volcanic region.

*North of the coast of Newfoundland and Labrador, great difficulties also obviously present themselves. Vast masses of floating ice would, at all times, render the operation of laying a cable a most difficult, if not an impossible, undertaking, and even if landed, it would be liable to perpetual abrasion. The long and dreary tract of inhospitable country that would have to be traversed by land-wires, to complete its connexion with the civilised portions of the American continent, would alone be sufficient to prevent its adoption.

These then are the considerations which led to the adoption of the route for laying the telegraphic wires across the Atlantic.

We now come to the means by which the electric current is to be transmitted. It is quite obvious that the great bulk and enormous weight of all previously manufactured submarine cables would preclude their use for a distance so great as that to which, it is hoped, the Atlantic Company are about to extend a successful operation. A form of cable had therefore to be devised, which should combine a maximum of strength with a minimum of weight, great flexibility with sufficient rigidity to allow of its being laid in a straight line,

a capacity of tension if needful to a moderate extent without injury, with cohesion sufficient to ensure resistance to a strain of considerable amount.

In the form of cable adopted by the Company,* it is believed that all these conditions are fulfilled. The conducting medium is formed by a strand of seven copper wires; six of these wires are wound spirally round the seventh, which latter is laid straight through the centre, and the diameter of the entire strand is somewhat less than the eighth of an inch. Around this strand are placed three separate layers of gutta percha, and thus the "core" is formed, which is about three eighths of an inch in diameter. Upon the core the appliances for sinking it and providing against the strain and abrasion incident to the paying it out into the Atlantic are laid. These consist of a soft bed of hempen twist saturated with tar, which is wound round the gutta percha core, and on the exterior of this is spun, in spiral continuity, eighteen strands of iron wire. This operation completes the cable, the total diameter of which is five-eighths of an inch, and the total length 2500 miles, or about a third of the earth's diameter. The total continuous length of the copper and iron wire employed in its manufacture will be 332,500 miles, and if extended in one line would therefore go fourteen times round our little planet.

The form of apparatus with which it is proposed to project the electric current through a conductor of such enormous length, has also been specially adapted for the purpose.

The connexion of Great Britain with America by the means thus delineated will, it is trusted, be realized by the end of August in the present year. The magnificent United States' frigate *Niagara*, commanded by Captain Hudson, will ship her portion of the cable, consisting of 1500 tons, at Liverpool, and H. M. ship *Agamemnon*, under Master-Commander T. A. Noddall, will receive an equal amount off East Greenwich. They will then proceed to mid-ocean, when they will commence paying out the cable, the *Niagara* steaming towards the coast of America, and the *Agamemnon* returning to England. The *Agamemnon* has been preceded by the paddle-wheel steam-frigate *Cyclops*, for the purpose of taking soundings; and steps have been taken by the Admiralty to secure for naturalists all the materials whether animal or vegetable which may be brought up from the sea bottom. Let us

* I am indebted to Mr. T. Holdsworth Brooking, F.R.G.S., for these details. Mr. Bright is the able engineer of the Atlantic Telegraph Company.

then wish every success to this gigantic project, by which, combining the discoveries of Wheatstone with the ingenious contrivances of Morse and Whitehouse, the Anglo-Saxon race is determined to show, that not the broad or deep ocean can really separate the two great families of the same race and lineage.

Free-Revolver Stand.—A most ingenious invention, and one which must prove of great use to seamen, having been made by Mr. Piazza Smyth, was recently tested by that skilful astronomer in his outward voyage to examine the natural phenomena on the Peak of Teneriffe, which has just been alluded to. This trial demonstrated the entire efficacy of his newly mounted "Revolver stand for steadying a telescope at sea."

Notwithstanding the excessive rolling and pitching of the vessel, he kept the sea horizon in one unvarying position in the field of the telescope long enough for several persons to observe it in succession. The only addition required was a remedy for the third element of motion, arising from the azimuthal yawing of the ship's head, and this his mind immediately suggested to him for consideration during a subsequent voyage.

New Geometrical Projection of two-thirds of a Sphere.—Our associate Colonel James, the Superintendent of the Map Office, has presented to us a copy of his new geometrical projection of a sphere, and in an accompanying letter has explained the manner in which the projection is made.

Its peculiar feature consists in the fact, that by it we are enabled to represent two-thirds of the surface of the globe in a strictly geometrical projection, much in the same manner that a hemisphere is represented in the stereographic projections: but as two-thirds of the surface of the globe includes the entire continents of Europe, Asia, Africa, and America, and indeed all the habitable regions of the globe, with the exception of part of Australia and some of the islands in the Pacific, this projection gives a more accurate representation of the relative position of every portion of the habitable globe (with the above exceptions) than any other, and as the circles of the parallels of latitude, down to the parallel of 47° , are complete, the circumpolar regions are very accurately represented. Availing himself of this latter advantage in his new projection, Colonel James is now having maps of the stars made on it, in which the circumpolar stars will appear in their true relative positions to each other and to the other stars, which will be included in the same map.

This projection of our Earth will be found of great use in many

scientific inquiries, and particularly when employed for geological lectures, in which it is required to bring as large a portion as possible of the land of the globe under the eye at once, and in which such distorted projections as those of Mercator or Babinet cannot be satisfactorily used.

Metallic Boats.—Our associate Major Vincent Eyre having suggested the use of metallic boats for Arctic as well as other expeditions, our Vice-President Sir George Back has strongly recommended the adoption of them for every purpose of inland navigation and among ice. Their great superiority to boats of wood was, he reminded us, clearly indicated when Lieutenant Lynch in 1848 passed down the river Jordan, running through thirty or forty desperate looking rapids and cascades, and, though frequently striking against sunken rocks, they received no injury beyond a few indentations; whilst a wooden boat of the expedition was broken up and lost.

Bells on the Goodwin Sands.—Mr. George Chown has suggested a plan of attaching bells to the buoys placed over sand-banks or rocky reefs, so that in heavy mists and storms when the mariner cannot discern the buoy, he may be warned off by the ringing of a bell, which will sound as long as the buoy is agitated by the waves. Leaving this matter for the consideration of our nautical members, the suggestion seems to me to deserve serious consideration; seeing that such bell-buoys might be advantageously used, not only on sandy shoals like the Goodwin Sands, but might, if found to work well, be placed on lines at a certain distance from dangerous rocky headlands on which so many wrecks occur, such as the Deadman and the Land's End in Cornwall.

Europe.—Among the many proofs of the prevalence of the good feeling now happily subsisting between our nearest foreign neighbours and ourselves, the proceedings of the Geographical Society of France offer striking examples. Thus we have seen the accomplished geographer M. de la Roquette zealously devoting his best energies to the publication of a sketch of the life of Franklin, and then coming forward generously with a large subscription to aid in the final search after the ships and crews of our illustrious countryman. Next we find the same liberal spirit evinced in the award of their annual Gold Medal to our own Livingstone.

When we turn from the general efforts of the Geographical Society of France to the works executed by the Imperial Government, we recognize a steady progress in the surveying and mapping

of all tracts, coasts, and bays to which the influence of France extends.

Through the obliging communication of Rear-Admiral Mathieu, the Director of the Charts and Plans of the Imperial Navy, a catalogue has been transmitted to us of all the works of that nature which have been published, or are in the course of execution, during the years 1856-57. Referring you to this list which will be published in the Appendix to our Volume, I may now simply state, that it comprises four charts of the rivers Gironde, Loire, and Seine, in France; seven of the coasts of Italy, from Genoa to the Tiber; three of the Black Sea and environs, one of which is a detailed plan of the Bosphorus, in three sheets: and no less than fifteen charts and plans relating to various parts of the Mediterranean, both on the African and Spanish shores, even up to Ceuta, Algesiras, and the Straits of Gibraltar. In the sequel, and in speaking of the absence of good maps of Southern Italy, it will appear that in her occupation of the Papal States, France has effectually supplied that desideratum.

If we turn to the far west, we perceive that our active allies have been vigorously surveying the coasts of that central region of America which now justly occupies public attention, and that Haiti, Bahia, and New Grenada have also come in for their share of exploration: whilst of Newfoundland, not less than ten plans of bays, havens, and islands have been completed. From Iceland on the north to China and New Caledonia on the south-east, we have numerous examples of that zeal and precision of geographical survey which has characterized the French geographers from the days of d'Anville and Cassini.

To five new plans of the ports and bays of New Caledonia, a chart of the Archipelago of Pomatou, and six charts and plans of portions of the coast of China, are to be added numerous works included under the head of "Nautical Instructions," which are of great value to all seamen. In the present list we meet with Illustrations of the Sea of Azov, Nautical Description of the North Coast of Morocco, Instructions for entering the Port of Alexandria, Manual of the Navigation of La Plata, Description of Passages between Luçon and the Main Islands of Japan, together with General Considerations on the Pacific, &c.

Siam.—This ancient kingdom, so renowned in history, has hitherto remained without a Trigonometrical Survey, though its surface is, perhaps, more diversified and offers more attractions to the phy-

sical geographer than any area of similar extent in Europe. The Spanish Government is now, however, removing this opprobrium, through the agency of a commission composed of officers of the Engineers, Artillery, Staff, and Navy. ●

In 1854 the preparatory works were commenced for laying down the Trigonometrical Survey of Spain. The principal base line was measured on the plain near Madridejos, in the province of Toledo, and on the road to Andalusia, about 100 kilometres from Madrid. Its length is 14,480 metres. The first reconnaissances for several systems of triangles were made in the same year 1854, and in 1855 and 1856. One of these follows the direction of the meridian of Madrid, near which the primary base line is situated, and ends northwards in the neighbourhood of Motril, resting on the great mountain range the Sierra Nevada, and comprising in its network the towns of Ciudad-Real, Jaen, and Granada. Towards the north it is prolonged to Santander, including Segovia and Bugos. This chain is extended eastward, following the coast till it joins that of the triangles of the French Etat-Major on the Pyrenees, at the stations of Biarritz and Baigorri. This portion comprises the capitals of Bilbao and San Sebastian.

Another series is extended in the direction of the parallel of Madrid, and runs eastwards to the Mediterranean, resting on several points of the French triangulation made by Mechain and Delambre, and subsequently by Biot and Arago, for the prolongation of the meridian of Dunkirk, and taking in the chief towns of Teruel and Castellon de la Plana. Towards the west, this series passes by Avila, and for the most part following the direction of the Sierra de los Gredos, terminating in the interior of Portugal, on stations of the triangulation already made in that kingdom.

Another secondary series, leaving the last mentioned, has a northward course, terminating in the Cape Di Peñas, taking in Salamanca, Zamora, Leon, and Oviedo, all capitals of provinces. This chain is intersected perpendicularly by another which commences from that of the meridian of Madrid, to the south of Burgos, and runs westward, taking in Palencia, and following nearly the northern boundary of Portugal, until it reaches the sea near Vigo.

Another secondary chain of triangles has been similarly projected, which rests on that of the parallel of Madrid eastward, and stretches northward to Pampeluna, to connect itself with the French triangulation of the Pyrenees, passing by the Moncayo and between Saragossa and Soria. This chain has a branch which runs westward between the towns of Soria and Logroño.

In the early part of this year (1857) the instruments arrived for the definitive measurement of the fundamental base line, which will probably be effected immediately. Of late years, the Corps of Engineers has continued the survey of the fortifications and their environs with great minuteness and precision, whilst the *Etat-Major* has executed military reconnaissances of the principal lines of communication and of the battle-fields of Spain. The works carried out by the engineers of "*Ponts et Chaussées*" and other persons concerned in projecting roads, and especially railroads, have produced some interesting geographical details, especially with reference to the inequalities of the surface.

The commission formed for making the geological map of the Province of Madrid has zealously continued its labours in it and in the surrounding districts. Some of its Members, moreover, have made some interesting reconnaissances and surveys in the mountains of the provinces of Palencia, Santander, and Leon, which will be continued throughout the length of that great mountain range.

In the course of 1856 our correspondent Colonel Coello published maps of Almeria, Orense, and Pontevedra, and the supplements of Leon, Caçeres, and Badajoz. The engraving of the maps of other provinces, by the same accomplished geographer, is far advanced, and in 1857 the remaining reconnaissances may, it is hoped, be finished.

Some memoirs and articles bearing upon the geography of Spain have also been published, both in separate papers and in the scientific journals, the '*Revista Minera*,' the '*Memorial de Ingenieros*,' &c.

M. A. de Linera has completed a small work upon the Sierra Nevada. M. Rojas Clemente had, half a century ago, fixed the height of the peak of Mulahacen at 3555 metres, an altitude which has been adopted by the Bureau des Longitudes of Paris. From new measurements it appears that this peak is only 3399 metres high: and hence the peak of Nethou, in the mountains of Venasque, in the Pyrenees, and near the French frontier (3405 metres), would seem to be the highest point in Spain.

Between the Pyrenees and the Sierra Nevada there are three other very considerable mountain groups. 1st. The Sierra de los Gredos, the highest peak of which, or Plaza de Almanzor, reaches to 2630 metres, according to the trigonometrical measurements of M. Subercase. 2nd. The Torre de Cerredo, one of the celebrated

'*Picos de Europa*' between the Asturias and Leon. According to the observations of M. Casiano de Prado the mountain is 2668 metres high, and is composed of Carboniferous Limestone. 3rd. La Sierra Sagra de Huescar, on the borders of Andalusia and the kingdom of Murcia. According to the observations of MM. de Verneuil and Collomb,* this lofty mountain (2400 metres) is composed of Jurassic Limestone.

That indefatigable explorer and sound geologist, M. Casiano de Prado, aware that he could not adequately express those geological discoveries which he is continually making in his native land, if unprovided with good geographical data, has himself surveyed the province of Palencia, of which, in the course of the year, a map will be published exhibiting all the geological as well as geographical features of that interesting tract. M. Casiano is also continuing his researches in a more southern region, and is preparing a map of the province of Leon.

M. Vezean, a young student of Montpellier, has, it appears, published a geological map of the environs of Barcelona, the data of which are spoken of favourably by M. de Verneuil, as having been laid down on a local survey, which contains many corrections of pre-existing maps.

I cannot conclude this notice of the progress of geography in the Peninsula, without reminding you of the great value of the researches of my dear friend and old companion in Russia, Sweden, and Germany, M. Edouard de Verneuil, one of the most distinguished members of the French Institute.† During several consecutive years this eminent geologist and palæontologist has so laboured, entirely at his own cost and unaided by any government, that he has not only thrown a new light upon the internal structure of large regions of Spain, but has, by careful barometrical measurements, determined the heights of many of the most lofty mountains, and of localities equally important to the geographer and naturalist as to the geologist, all of which were previously unknown.

Switzerland.—The very able notices on the progress of Swiss geography, which have been received by the Secretary from our

* See *Tableaux Orographiques* par MM. de Verneuil, E. Collomb, et de Lorient, Bull. Soc. Geol. de France, 1854, and *Comptes Rendus*, tom. xl. 1855.

† The account of the progress of geography in Spain I owe to M. de Verneuil, who obtained the details of the Government Surveys from Colonel Coello, whose maps, above alluded to, are to be added to the great statistical work of M. Madoz.

distinguished correspondents Chaix and Ziegler, will be noticed in an early publication, and reviewed at the next Anniversary.

Italy.—The most important contributions to geography during the past year have been the continued publications of the great Government Surveys in Piedmont and Central Italy.* The Piedmontese survey, on a scale of $\frac{1}{300,000}$, is nearly completed, and upwards of forty sheets have been already given to the public.

My predecessors in this Chair and myself have had occasion to allude to the Austrian Survey of Central Italy, perhaps the most important work of the kind connected with Italian topography. I am happy to announce that this great work is now completed—the last sheets embracing the mountainous region of the Marci, Hernici, Volscii, and Sabines, on the Roman and Neapolitan frontier. The *Carta Topografica dell' Italia Centrale*, in fifty-two sheets, embraces the whole of the Tuscan and Roman States, on a scale of $\frac{1}{300,000}$, and forms a suite to the elaborate surveys of the Lombardo-Venetian kingdom, and of the Duchies of Modena, Massa, Carrara, Parma, and Piacenza, published some years before by the same Government. A reduction of the *Italia Centrale*, in four sheets, is now in progress at Vienna.

Rome.—The wish so long felt by every antiquary, geographer, and geologist, to possess a good map of the environs of Rome, has been at length satisfied by the publication of the elaborate survey, undertaken by the officers attached to the French Army of Occupation, and of the last sheets of the Austrian map of Central Italy. The French map, in four large sheets, has just been completed, and is in every respect worthy of the *Dépôt de la Guerre*, from which it has been issued. The scale is the same as that of the great Trigonometrical Map of France, $\frac{1}{300,000}$; it embraces all the Roman territory between the parallels of $41^{\circ} 30'$ and $42^{\circ} 20'$, and as far east as the meridian of $12^{\circ} 55'$ east of Greenwich, consequently the most interesting parts of Southern Etruria, of the Sabine territory, and of Latium, in the vicinity of the capital of the Roman world. The topographical details are beautifully laid down; those of the volcanic group of the Alban range are in this respect remarkable. Two advantages of the French Survey over the Austrian consist in having the heights of the principal localities marked, and their ancient names annexed. The Roman Government is now preparing a map of the

* For these details respecting the geography of Italy, I am indebted to my gifted friend Mr. Pentland.

environs of Rome, nearly upon the same scale as the French Survey, upon which will be laid down the principal estates of the great landowners; and M. Rosa, a very laborious topographer, who has already surveyed in great detail many of the most interesting districts around the Eternal City, has just completed a very beautiful map of the Alban hills, on the eve of publication by the Roman Topographical Office (*La Direzione del Censo*).

In the posthumous work of the late eminent Antiquary, Architect, and Topographer, Commander Canina, are contained several maps and plans of considerable interest in a geographical point of view, amongst which the revised edition of his great map, in six sheets, of the Campagna of Rome, of the Upper Valley of the Anio, with detailed plans of the most remarkable ancient towns and classical sites of the Alban Lakes, and the ancient ports of Centumcellæ, Portus Trajani, Ostia, Antium, &c. &c. Connected with our pursuits may be mentioned the detailed statistics of the Roman States (*Statistica della Popolazione dello Stato Pontificio*), just published by the Papal Government.

Naples.—I am not aware that any progress has been made by the Government of this country in the great Survey of the kingdom, inaugurated by our late Associate, General Visconti.

The French Dépôt de la Marine, having obtained the consent of the King of Naples to prolong its hydrographic survey of the West Coasts of Italy, beyond the Neapolitan frontier, M. Darondeau has been able, during the past year, to complete it as far south, and including the Bay of Naples, the Ponza Islands, &c. This, with the survey of the Roman Coast, is terminated, as my friend Mr. Pentland tells me, and will form a worthy complement to the great survey of the coasts of Italy, commenced in 1841, and which extends from the mouth of the Var to the Island of Capri. M. Darondeau is now engaged in rectifying the charts of the Lipari Islands, in the position of some of which errors of importance have recently been pointed out.

Island of Sardinia.—General A. della Marmora has completed his labours on the Physical Geography and Geology of this interesting island, by publishing the last volume of his great work, containing geology and descriptions of the fossils, by the eminent palæontologist, Professor Meneghini, of Pisa. As General Alberto della Marmora (brother of the Sardinian commander-in-chief in the Crimea) has devoted the best years of his life to the accomplishment of this ar-

duous task, I have sincere pleasure in recording my hearty approval of a work, in which he has united the powers of a skilful physical geographer with those of an indefatigable geologist.

GERMANY.

The progress of geographical science is now so well promulgated through Germany by the '*Mittheilungen*' of Dr. Phil. Petermann, that it is unnecessary I should do more than call attention to the value of this methodical and well-illustrated monthly Periodical. In it are to be found accounts not only of what is written or recorded in the Geographical Societies of Berlin, Vienna, and other cities, under the guidance of a Humboldt, a Ritter, and a Haidinger, but also reports of descriptions of newly-explored countries in various distant regions, accompanied by well-executed maps.

Aware that a certain amount of discontent has sometimes been expressed, at the appearance for the first time in this German work of the voyages and travels of individuals who have been, or are in the pay and service of Britain, I would beg my associates to consider, how natural is the feeling of any foreign traveller engaged in the British service, to wish to see the outline of his researches first made known in his native land, and how his countrymen on their part should feel a just pride whether in perusing or in publishing the writings sent home to them in their vernacular freshness from remote corners of the earth, with which they are necessarily less familiar than the people of a maritime country like our own.

Whilst then there have occurred examples of the publication of the outline of travels of English agents for the first time in German, which might have been previously noted in the Proceedings of our Society, as coming from the Secretaries of State who are our Associates, and who usually send to us their earliest communications respecting foreign travels, I would earnestly deprecate anything approaching to a feeling of uneasiness upon this subject.

Contented with the reflection, that knowledge cannot be too widely diffused, let us hope that our German friends, clearly recognizing and honouring the British channels through which their information is obtained, will always work harmoniously and in unison with us. Banishing therefore all jealousy, and admiring the perseverance and skill of such contemporaries, I am bound in fairness to say, that the '*Mittheilungen*' is exercising a powerful and salutary influence on the progress of our science; and as the spi-

riter proprietor of this Periodical, M. Justus Perthes of Gotha, has spared no expense in bringing out the work in an attractive form, so I rejoice to hear that its sale is becoming very large—upwards, as I am told, of 3000 copies being in monthly circulation.

The advancement of our science in Prussia has, I am sorry to say, received a serious check in the recent decease of Dr. Gumprecht, the Editor of the 'Monats-Berichte' of the Geographical Society of Berlin, who, after successfully prosecuting some branches of geology, had devoted himself with great energy to the extension of our acquaintance with the geography of Southern Africa. But what is most deeply to be regretted is, that he was suddenly carried off when engaged in a great and important work on the geography of Germany, a subject, on which I hope, through the assistance of my friend M. Ritter, to be better enabled to speak at our next Anniversary.

In this brief and very imperfect notice of the progress of geography in Northern and Central Germany, I have great pleasure in specially acknowledging the accession to our collection of many valuable maps published by the Bavarian Government, which have been communicated to us through His Excellency Baron de Cetto.

Of the distinguished travellers Schlagintweit it is my province to speak in a notice of Asiatic discoveries.

Austria.—Endowed with various noble establishments for the advancement of science, possessing many good geographers, and publishing most admirable maps of the different parts of her empire, Austria was without a Geographical Society until the 21st of September of last year. It was then that my valued friend William Haidinger, long known as an eminent mineralogist and geologist, and much esteemed by his contemporaries in every land as well as in his own, uniting with a few zealous friends, and obtaining the consent and protection of the Government, established the Imperial Geographical Society of Vienna. To a great extent this body, like that of St. Petersburg, is founded on the model of our own Society, though the regulations and interior management necessarily vary with the different form of the Government of the country.

In speaking of the Proceedings of this Society, I cannot avoid specially alluding to one point of the proceedings of our Austrian friends: namely, the recent departure of the Imperial frigate the *Novara* on a voyage of scientific exploration round the world. When this expedition was decided upon, and a number

of able men were chosen, to form its scientific staff, the President of the Imperial Geographical Society having applied to me, and explained its object, I had real gratification in writing letters of introduction to all the authorities, with whom I was acquainted, at the places which this frigate might visit. Admirably organised, the expedition has enjoyed the great advantage of having had its officers furnished (as M. Haidinger informs me) with the minutest instructions of the venerable Humboldt, whether upon the magnetic equator, the magnetic curves in the different oceans, the lines of no deviation and equal intensity, or on cold and warm currents, particularly those along the Peruvian coast, and on the tropical East and West counter-currents. The great traveller has also enjoined the cutting of marks on the rocks, to register the actual mean level of the sea, the same practice which he had formerly recommended for adoption on the shores of the Caspian; and he has especially urged the collection of specimens from the active volcanos of South America, which he has enumerated *seriatim*, with a view to a correct classification of such igneous products, which he believes will be found to exhibit an arrangement in separate linear masses.

If I may judge of Dr. Scherzer and the other gentlemen who accompany him by the encouraging example of his associate Dr. Hochstetter, the geologist, who visited this country to obtain from General Sabine information and instruction in making magnetical observations, I can have no hesitation in saying that this first effort of Austria to circumnavigate the globe will produce a harvest worthy of that ancient empire, and will reflect the highest credit on the new-born Geographical Society of Vienna.

Russia.—With the return of peace, which has happily taken place since our last Anniversary, it is most gratifying to one who has been so long connected with the science of Russia as myself, and who has been so heartily welcomed in that Empire by all persons, from the Emperor to the peasant, to be enabled to recur to the geographical labours of those old allies of our country, to whom I am naturally much attached.

Whilst the late war impeded all scientific communication with the countries of the West, Russia was steadily advancing researches of the highest importance to physical geography in her distant and slightly known territories, and particularly on the north and east. The great expedition to the northern part of the Ural Mountains, under the conduct of Colonel Hoffmann, had indeed obtained, before the war, the active support of the Imperial Geo-

graphical Society, and of its President the Grand Duke Constantine.

The second volume of the work descriptive of this long and laborious enterprise has recently been published; the first part, by Krusenstern, having already been made known to geographers. This second volume specially relates to the 'Pae-Khoe,' or Rocky Mountains, and has completely satisfied the expectation of naturalists, physicists, and geologists. The historical and geological portion by Hoffmann; the classification and description of the fossil organic remains by Count A. von Keyserling, my distinguished coadjutor in earlier days; and the descriptions of the minerals by Gustaf Rose; of the animals by my colleague of the Imperial Academy, Brandt, and of the flora by Ruprecht, together with meteorological, physical, and hypsometrical observations, are all of a high order of merit. The exploring parties examined the principal chain of the Ural, north of Petropaulovsk, from the sources of the river Petchora up to the highest northern peak ($68\frac{1}{2}^{\circ}$ S. lat. and $66\frac{1}{2}^{\circ}$ E. long.), which, hitherto nameless, had been termed by this expedition Konstantinov Kamen, in honour of their geographical president, his Imperial Highness the Grand Duke Constantine. Westward from this point runs another mountainous ridge, the Pae-Khoe, continuing in a w.s.w. direction, and running parallel to the northern coast as far as Vaigats Strait. The highest point of it is the Pue-daia, and the geological structure proves that the Pae Khoe is not, as hitherto supposed, a continuation of the Ural.

The average height of the northern Ural is about 3000 (the Töll Pass and Sabla are above 5000) feet. Patches only of snow are visible on some mountains, but no lasting covering of it is seen at 68° S. lat., although, as Leopold von Buch remarks, snow is found in Norway at 67° , and at a height of 3500 feet only. The volumes in which these important explorations are described, are characterized by a minuteness of detail, on all branches of science within the scope of the undertaking, which entitles the work to rank as one of the most valuable scientific publications that Russia has ever produced. The accompanying map is of great use to practical geographers, and a marked addition to the pre-existing geography of Europe.

The efforts of the Imperial Geographical Society to diffuse an adequate acquaintance with our science throughout the interior of Russia have been most commendable. Thus, this body not only publishes volumes and bulletins like our own, but also translates

into Russian, useful standard works, including those of the celebrated Carl Ritter, and brings out catalogues of the geographical maps of Russia, as well as reviews of geographical, statistical, and ethnographical labours. Even the commerce of the interior comes within the scope of our vigilant rivals, whose Society was founded on the model of our own.

The most extensive scientific exploration which the Society has ever undertaken, is one which is still in progress, or that of Eastern Siberia. Its object is to examine and determine, by astronomical and trigonometrical observations, the geographical features of the vast region between the Lena and the Vitima, and also of the south-eastern tracts beyond the Lake Baikal. The chief astronomer, M. Schwartz, has under his direction MM. Oussoltzoff and Sminia-guine, and is accompanied by the artist and academician Meyer, and by M. Radde the naturalist.

The results of the first year's labours are given in the '*Compte Rendu*' of 1855, edited by M. Lamansky, and there can be no doubt that geographers will soon possess not only a correct delineation of these remote regions, but also striking and characteristic sketches of the scenery of all the border frontier regions of Siberia—a map of the river Amur having been already published. Among the great feats of our contemporaries, I learn that MM. Semenoff and Wasiljin have made known the existence of an extinct volcano near Mergen, in Manchuria, which was in activity in the year 1721; and that the mountain of Demavend has been ascended by M. Khanikoff.

In writing to me of these explorations, and of a remarkable expedition to the Lake Issingul, my illustrious friend Humboldt thus expresses himself:—"On the northern side of the great volcanic chain of Thian-Chan, they have, it is true, discovered plutonic rocks only, such as granite and gneiss, and along the edges of the great bitter lake of Central Asia (Issingul) no trachytes (volcanic rocks) have been seen; but it must not be forgotten, that from the eastern shore of that lake to the Volcano Peschan (the most western of the volcanos of the Thian-Chan, or Celestial Mountains) the distance, in a straight line, is not less than 250 English miles."

In reference to Eastern Siberia and those vast tracts of Central Asia which lie between the defined boundaries of the Russian and Chinese Empires, let me say that the English public will soon have presented to them a work containing the most vivid and remarkable

pictorial representations from the pencil of their countryman, Mr. J. W. Atkinson.

Under the patronage of the Emperor Nicholas, Mr. Atkinson devoted seven years of his life to the exploration and delineation of a region, of the greater part of which no European had hitherto obtained the slightest knowledge. Let my associates inspect the large original water-colour landscapes by this artist, representing the marvellously tinted and wild rocky countries of Mongolia, the great Steppes of the Khirgis and Chinese Tartary, including views of even the snowy Thian-Chan, of which reduced engravings will soon be published, and they will readily admit, that if such sterile, igneous, rocky masses, should not afford gold or silver, they can prove of little value to any civilized country.

Among the subjects treated by the Russian geographers during the year 1856, the mere enumeration of the following works, which constitute a very few only of the communications to the Imperial Society, will show the importance of its labours:—The Geography of Vegetables, in four vols., by M. Béketoﬀ; the Fauna of the Mouth of the river Amur,* by Schrenck; a new Ethnographical Map of Europe, by Koeppen; the Geographical and Ethnographical Terminology of Central Asia, by Stehoukine; Report of Lieutenant Oussoltzoff of a Voyage to the Sources of the River Vitima; and an account of those Volcanos of Central Asia, by Semenoff and Wasiljin, to which allusion has just been made.

Asia Minor.—In February of this year, I had the pleasure of communicating to the Society a memoir, which I had received from General Jochnus, relative to a proposed communication in Asia Minor between the Lake of Sabanja, the River Sakaria, and the Gulf of Nicomedia. The utility of this project had been fully recognized in ancient times, and the question has been several times agitated, at widely different periods, up to the close of the last century. The distance from the River Sakaria to the Lake of Sabanja, between which there already exists a natural communication by the little river of Sari-deré, is not much more than three miles and a half; and from the Lake to the Gulf of Nicomedia it is scarcely nine miles, whilst no difficulty exists on the score of difference of level. There can be no doubt that such a system of canals, of sufficient width

*See p. 126 *infra*, for a notice of the hydrography of the river.

and depth to admit of the passage of coasting-vessels and small steam-boats, would open up valuable internal communication for the ready supply to Constantinople of wood, charcoal, and the most necessary articles of daily consumption.

Persia.—During the present session, whilst our country has been temporarily engaged in hostilities with Persia, it has been our good fortune to have present amongst us our distinguished medallist Sir Henry Rawlinson, who has enlivened our meetings by his agreeable and instructive lessons on the geography of countries with which he has made himself so intimately acquainted. By his extensive personal knowledge of the East, united with those varied attainments in classical and Oriental literature, which have made his name distinguished throughout the world, Sir Henry has been enabled not only to communicate to us information of the most important nature with respect to the modern geography of Southern Persia, but also to illustrate that information from the rarer resources of his own especial studies in ancient history. With respect, moreover, to the recent movements of our army in Persia, the strategical knowledge of Sir Henry has added a peculiar interest to his observations on the country where they have taken place. I cannot refrain from congratulating you, at the same time, on having had the advantage of two such able and experienced commentators on these interesting and important subjects as General Monteith and Mr. Layard.

In summing up the results of the information we have thus gained, I will here confine my remarks to that which is essentially geographical. The most striking points to which our attention has been drawn, in this respect, are the changes produced in the chanpels of the rivers and on the coasts immediately proximate to their embouchures. These important facts are worthy of especial notice, both in a prospective and a retrospective sense, since they will materially modify our calculations in the more doubtful reading of early history, and our judgment as to calculations with respect to the future condition of these coasts. The agents of these changes are clearly intelligible. There are but two winds which prevail in the Persian Gulf—the north-west and the south-east, and, when the latter sets in, the whole force of the Sea is brought to bear directly against the current of the Euphrates, and hence an enormous deposit of the alluvium brought down by the stream is effected, thus barring up its mouth. This deposit, constantly on the increase, progresses, by Sir Henry's calculation, at the rate of a mile

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in the lapse of thirty-five to forty years. An example of the effect of this agency in by-gone times is adduced in the fact, that a great city, of which the ruins are to be seen above Mohammerah, was an island in the time of Sennacherib, named Billat, and can be shown to have been still an island in the time of Alexander. At the present time it is sixty miles from the embouchure of the river, and a succession of cities can be traced upon the desiccated delta below it, along the river, down to the sea.

A question of essential moment has also been explained by Rawlinson as to the frontier line between Turkey and Persia,—a point upon which our maps have been greatly wanting in correctness. The real line of frontier—as determined by the Commission of Delimitation, appointed under the provisions of the Treaty of Erzerüm—comes down to Mohammerah, and then follows the course of the Euphrates to the sea. It was agreed that the country watered by the Euphrates belonged to Turkey, and the country watered by the Karun to Persia; but the question was, whether Mohammerah was on the Euphrates or on the Karun. It was decided that the place should be considered to belong to Persia, but as according to Sir Henry's belief it is situated on the Euphrates, this decision would seem to be contrary to geographical accuracy.

Thibet.—Early in this year some extracts were read to the Society from the memoir of a journey across the Kuen-luen from Ladak to Khotan, communicated by Colonel Sykes from the brothers Schlagintweit, already so well known to geographers and naturalists by their labours on the physical geography and geology of the Alps.

These accomplished gentlemen, who travel by the desire of the King of Prussia, and at the suggestion of Baron Humboldt, have been employed, under the patronage of the East India Company, in the physical survey of the distant trans-Himalayan regions. The extracts communicated to us, form a small portion only of the information they have sent home, but from some brief allusions to the groups of hot springs near the Kiok-Kiul Lake and the Valley of the Nubra, we may feel assured that, when all their memoirs are published, they will be found replete with curious observations on many subjects; and specially on those mineral springs to which Humboldt long ago invited attention, as proofs that the Kuen-luen was of volcanic origin.

The brothers Schlagintweit have laid down the entire orography of Kemaun. M. Adolf Schlagintweit, after visiting the glaciers of

Pindari, was joined by his brother Robert; and they examined together the glacier of Milum, which surpasses in extent all those of Switzerland. It is from 8 to 10 miles in length, and 3000 feet broad. The mountains which surround this glacier consist of crystalline schist, covered by fossiliferous strata of the Silurian age. The two brothers have also measured the height of Nanda Devi, an insulated peak surrounded by deep precipices, at the foot of which is the glacier of Pachou.

But rather than attempt, on my own part, any sketch of what these distinguished German travellers have accomplished, I will here quote to you, from the pen of Humboldt himself,* a short summary, which he has sent me, of their remarkable explorations.

“Hermann and Robert Schlagintweit,” says the Baron, “have had the proud satisfaction of passing in August, 1856, the chain of the Kuen-luen mountains, and of reaching Eltschi in the province of Khotan. As I am vain enough to believe that my map of Central Asia (the result of five months’ labour, in bringing together the detailed accounts of the Buddhist priests Fahian and Stenan-thiang, with those of Marco Polo, Wood the explorer of the Pamir, Burnes, Vigne, together with the excellent sources of information supplied by Klapproth and Stanislas Julien) represents more faithfully the formation of the ground than the other maps in your possession, the range of which beyond the Himalaya is mythologically doubtful, I invite you to examine it before you read or rather try to decipher these lines. A botanist of the highest merit, Dr. Thomas Thomson, who, conjointly with my excellent friend Joseph Hooker, published in 1855 the ‘Flora Indica,’ says in the Introduction Statistique, p. 215, ‘The chain of the Kuen-luen, where it forms the northern boundary of Western Thibet (where Dr. Thomson resided a considerable time), is as lofty as the Himalaya.’ *Its axis has not been crossed by any European traveller, but has been reached by Dr. Thomson, who visited the Kara-korum pass, elevated 18,300 feet. This testimony will show you the importance of the success of the brothers Schlagintweit. On the morning of the day, on which they crossed by the Kara-korum pass, they met a caravan coming from Yarkand, and near the salt lake of Kiok-Kiul they found the hot springs of Panamik and Tchanglung, with a Centigrade temperature of 74° 2’ and 78°, and on an immense plateau at altitudes of from*

* For the letters of the brothers Schlagintweit, communicated by Baron von Humboldt, see also the Berlin ‘Zeitschrift der Allgemeiner Erdkunde’ for 1856, pp. 532, 551.

16,800 to 18,000 feet, they had to endure a degree of cold at their nightly bivouac of $11^{\circ} 4'$ Cent. below freezing point. Fahian, at the close of the 4th century, writing of Bushia south of Eltschi, the capital of the province of Khotan, praises its high cultivation; its elevation being not more than 9200 feet. 'We were at a day and a half's journey,' say the Schlagintweits, 'from the northern part of the high chain of Kuen-luen. After leaving Sumgal, we travelled for three days along the banks of the Karagash, which gave us an opportunity of inspecting the famous quarries of stone called Yaschem, which people come from a great distance to visit. Between Kara-korum and the Valley of the Nubra we measured several mountain peaks above 24,000 feet of absolute elevation. The dip of the magnetic needle between July and September is registered in figures.' The geological excursions of Adolf and Robert Schlagintweit in Eastern Thibet by Niti and Gertope, to the glacier of Ibi Gamin, have also been very important. The travellers reached it on the 19th of August, 1855, and trusting to the corresponding observations in Agra, fixed the height they attained on Ibi Gamin at 22,260 feet = 20,886 French feet. This is not only higher than I reached at Chimborazo (18,096 French feet) in 1802, and which Boussingault made (18,480 feet) in 1831, but it is also higher than the summit of Chimborazo itself, which I found by trigonometrical observation to be 20,100 French feet in height. As the Schlagintweits were the first who reached the top of Monte Rosa, they are accustomed to this kind of expedition. A portion of their magnetic observations of the Himalaya has been printed separately at Calcutta, and my respected friend General Sabine will doubtless give them due credit for their assiduity. They have also made some interesting and delicate observations on the influence of great heights on the variation of the magnetic needle. They will bring back to England some beautiful geological collections, perhaps even in the course of this autumn; for you are aware that by the munificence of the East India Company and the generous kindness of Colonel Sykes, who is a noble advocate of every thing which appertains to the sciences, the brothers Schlagintweit have received every encouragement."

When I reflect that these brothers have penetrated farther into Thibet and Tartary from the plains of India on the south, than any other European; that their physical, geological, and geographical observations are said by Humboldt to be of the highest value, and that they have even made photographic sketches at heights of

20,000 feet above the sea, I cannot but rejoice, that these élèves of the great traveller of the age, should have performed journeys, which have elicited from that illustrious man, now in his eighty-seventh year, the expression which I have read to you, reminding us of the best days of the explorer of the Andes and Siberia.

BORNEO, BURMAH, AND CHINA.

Borneo.—Our Associate Mr. A. R. Wallace has supplied us with some important corrections of the north-west portion of the map of Borneo, derived from his observations in a journey up the Sadong River. From his account we gain valuable additions to our information respecting the physical geography of that vast island, together with some very interesting comparisons, bearing on the ethnological similarity between some tribes of the Dyaks and the Indigenes of the valley of the Amazon. Amid the uncertainty which hangs over the history of the migrations of various branches of the human family in remoter periods, these notices of distinct resemblance are of especial moment; and in the present instance the observations of Mr. Wallace are confirmatory of the views of Dr. Latham and others, who regard the Americans as Mongols who have emigrated direct from Eastern Asia.

A further exploration of this important island has been set on foot during the past year by Lieut. C. A. C. de Crespigny, R.N. Great importance must be attached to the investigation of the resources of this vast country, which is already known to be largely productive of some of the choicest desiderata for the advancement of civilisation. As a mineral country it is, according to Mr. John Crawford, perhaps the richest in the East. Gold, coal, antimony, iron, caoutchouc, and gutta-percha, have already been derived from it in abundance; and who shall say what further discoveries may lie open to the search of a skilful explorer? The geographical position of the island moreover, lying, as it does, in the direct route between China and Australia, presents an additional stimulus to the development of its unknown resources.

It is satisfactory to know that our Medallist, Rajah Brooke, has been anxiously occupied in developing various branches of industry within the range of his jurisdiction at Saráwak, among the most important of which must be classed the opening of coal-mines; and it is indeed a matter of sincere congratulation that he should recently have escaped from the imminent danger in which he was placed by the late insurrection of the Chinese settlers.

Burmah.—We are indebted to Captain Yule, of the Bengal Engineers, who had been sent by the Indian Government to Amarpura as secretary to Major Arthur Phayre, for a most valuable communication on the geography of Burmah, with an illustrative map of that country. Captain Yule has compared and brought together with great ability the various valuable surveys of several of his precursors in different parts of this extensive field of operations. His principal materials were a Survey of the new British Province of Pegu, by Lieut. Williams of the Bengal Engineers, still in progress; a New Survey of the Province of Martaban, by Mr. Hobday; a Survey of the Irawady to Ava, by Captain Rennie and Lieut. Heathcote of the Indian navy. Besides these data, Captain Yule contributes his own sketch of part of the Aracan Yoma range and its passes, and a rearrangement of the Chinese frontier and the Laos States east of Burmah, as taken from the Route Surveys of Dr. Richardson and Captain McLeod. A considerable error in the longitude of the Irawady at Prome, and the higher parts of the stream, as assigned in previous maps, is pointed out. This error, which, in 1853, Captain Yule had indicated as probable, in a Memoir on the Passes of the Yoma, has been confirmed by the surveys since made. The geological portion of the work by Mr. Oldham, the Superintendent of the Geological Survey of India, affords much important information respecting the structure of the country, the rocks, and their relations; and renders the publication additionally valuable by the observations it contains on the statistics of the productions of the country, including certain mineral substances described by that good geologist. This work, which was printed for limited circulation at Calcutta, by order of the Governor-General, is now in the course of publication by the East India Company, accompanied by a map, engraved by Mr. Arrowsmith; and Mr. John Crawford, who, from his acquaintance with the Burmese empire, is most competent to express an opinion, has spoken of it with marked approbation.

China.—Believing that our members would gladly receive information relating to China from so competent an authority, I induced our distinguished member Sir John Davis to read at one of our meetings a Paper of great value, and which many of you heard with pleasure.* Certainly no living Englishman, and indeed no living European, was so competent to such a task. He is among

* See Proceedings, No. IX.

the few of our countrymen who have acquired the difficult language of China, and he long filled the highest offices which an Englishman can discharge in relation to that singular country. The fruits of his literary labours have been several works, which have the rare merit of being at once popular and scientific. As one of the most important of these, his '*China and the Chinese*,' is by far the best account of the empire in any language, I am glad to find that a third edition of it has just been published.

AFRICA.

The additions to our acquaintance with the interior of Africa since the last anniversary, when my predecessor delivered the Patron's Gold Medal to Dr. Phil. Barth, have been considerable. That meritorious explorer of vast regions has since issued to the public three volumes, which, recording his earlier wanderings, are to be followed by two others, completing a work which will doubtless be considered the worthy termination of so many years of patient research under great privations. The maps which accompany the narrative have been executed by Mr. Petermann, from the careful itineraries of Barth, the astronomical determinations by Vogel of the positions of Murzuk, Kuka, and Zinder having formed the base. Dr. Overweg's determinations of latitude have been made use of as regards the route from Tripoli to Tintellust and the route to Musgu; and I learn from Dr. Barth that all these points will be discussed at the close of the work. I reserve, therefore, my full observations on the whole of the labours of the only British traveller who ever returned from Timbuctoo, until we have before us the concluding description of his arduous journeys. In the mean time, however, it may be truly said, that the volumes already published contain much valuable information, and show that Dr. Barth was so completely at home among the natives, with seven of whose languages he was familiar, and made such very diligent inquiries, that the information thus gathered, is far more ample and minute than that of his precursors; the itineraries, which have been compiled from hearsay evidence, being entitled to especial weight. It is particularly worthy of notice that the tracts which this traveller explored to the south of Lake Chad were found to be level, and abounding with lagoons, swamps, and long flooded tracts, analogous to those which Livingstone found to the south of the Equator, whilst the watershed between the affluents of Lake Chad and the river Benué

would seem to be little more marked, than that between the Zambesi and Lake Ngami of S. Africa. So much is this the case, that Barth suggests how boats may reach the lake in ascending from the sea.*

Independently of the impediments which the climate and its diseases offer to the research of Europeans, the other great obstacles presented to the enterprise of Barth and his companions have not, I apprehend, been sufficiently appreciated. All along the broad zone stretching across Central Africa, between 11° and 5° of N. lat., there prevails more or less a continuous and merciless warfare between the Mahomedans and the Pagans, which presents the most appalling checks to the traveller proceeding from the territory of any Mahomedan prince to whom he may be accredited. For whilst Livingstone has demonstrated the practicability of traversing vast tracts of Southern Africa, occupied by people speaking various dialects of the same language (none of them being Mahomedans), such facility of intercourse is forbidden through the region north of the equator. There, a solitary traveller, scantily supplied with means, has to cross this belt by proceeding through hostile tribes engaged in sanguinary warfare, and is at the mercy of every petty tribe and barbarous chief whose district he has to traverse.

Whilst in regard to Overweg, who, it appears, kept very few notes, we have to regret that nearly all the important information he had accumulated perished with him, I am bound to record that Dr. Barth deserves all praise for making and preserving detailed records, when struggling against depressing illnesses and great misery.

From what we know of the efforts made by himself and his associate, it is, indeed, too manifest that the progress of discovery in Africa, south of Lake Chad, can be only very slow and gradual.

Such, then, are the difficulties from which Barth has escaped, and of which he is now rendering us a vivid and detailed account—such is the country in which Dr. Vogel and his faithful attendant, Corporal Maguire, were left. My predecessor has recorded in his last and only Address, what progress Vogel had made after leaving Barth in 1854. Foiled in his attempt to reach Adamawa, the route between Hamarrawa and Yola being occupied by warlike bodies, Vogel had already determined by astronomical observations the real site of the important town of Yakoba, situated on a rocky plateau 2500 feet above the sea. Returning from Hamarrawa to Gombé, through

mountains inhabited by Pagan tribes, he left Corporal Maguire there, and turned westward himself to determine the waterparting between the so-called Yeou, the river which joins the lake Chad from the west, and the smaller and eastern branches of the Niger or Kwora. It was then that he discovered in a very hilly tract a northern or important branch of the Chadda, named Gongola, and proceeded as far as Zuriga, the capital of Zeg-Zeg, the erroneous position of which in previous maps he corrected. Proceeding to Bebeji, the site of which he also fixed, he arrived at Kano, a place then afflicted by cholera, and, returning to Yakoba, again descended into the valley of the Chadda at Zhibu of Dr. Baikie (Chunbum of Vogel). Visiting several places on the river, he observed a large cetaceous animal called Ayu, to which his attention had been directed by Barth, and since named by Professor Owen *Manatus Vogelii*.^{*} Having rejoined Maguire, who had suffered much in the mean time from sickness, they returned in December, 1854, to their head-quarters at Kuka. Procuring there fresh supplies he intended to proceed to the E. and S.E., and started for Waday on the 1st of January of last year, leaving Maguire in Kuka, since which time we have had no reliable tidings of his progress.

Dr. Barth suspects, however, that he must have made some stay at Loga or Logone, visited by both Denham and Barth, and perhaps in Bagirmi, where both the travellers also spent some time.

Whether the order ever reached Vogel to direct his steps towards the Nile is unknown, but at all events it is certain that he was proceeding in that direction, when, as it is reported, he fell a sacrifice to the orders of the savage King of Waday, such being the news brought by the natives to Corporal Maguire, and reported to the Foreign Office by Colonel Hermann, H. M.'s Consul at Tripoli. There is, indeed, too much reason to apprehend that this report may prove true, seeing that the King of Waday, a violent and revengeful man, may have taken the life of Vogel, because some of his sable majesty's property had unfortunately been seized and confiscated in the port of Bene-Ghazi to satisfy the claims of British merchants, and at the very time when an English agent was travelling in Waday.

On the other hand, knowing that both Dr. Barth himself and our other African Medallists, Galton and Livingstone, were reported to

^{*} For translation of Vogel's Paper by Dr. Norton Shaw, see Report of the British Association, 1856, p. 98.

be dead, and are now happily among us, I still entertain some hope, that the able and accomplished young Vogel may have escaped with rough treatment and detention only, and that he may return to receive the highest reward which this Society can offer for determining the true position of so many important sites of Central Africa.

Renewed Expedition to the Niger.—From the explorations in Central Africa, which have been progressing from the time of Mungo Park to the present day, let us now turn to the consideration of the expedition which has just been sent out to explore those central parts of Africa, watered by the Niger or Kwara * and its tributaries, and which, recommended to the attention of H. M.'s Government by the Royal Geographical Society and the British Association for the Advancement of Science, is commanded by our associate, Dr. Baikie, who so successfully led the party on the former occasion. Our members will also be glad to hear that this officer is accompanied by the same intelligent surveyor, Mr. May, R.N., who was his companion during the previous voyage up the Chadda or Benué; by Lieut. Glover, R.N., well acquainted with surveying and astronomical observation; by Assistant-Surgeon Davis, R.N., and by collectors of natural history specimens; whilst it is expected that the well-known Church Missionary, the Rev. Samuel Crowther, may also join the expedition on the coast.

The vessel for ascending the rivers is the *Day-Spring*, an iron screw steamer of 170 tons burthen, prepared by Mr. Macgregor Laird, combining 30-horse power with less than 5 feet draught of water, and arranged to carry three months' provisions and coals for 20 days. The main objects of the expedition as contemplated by the Earl of Clarendon, who has specially patronised and sanctioned it, and as organized by the Admiralty, are to explore the river Niger and its tributaries, to ascertain the natural productions and capabilities of the countries through which they flow, to enter into friendly relations with the native chiefs, to facilitate the return of liberated Africans to their homes, and practically to show the advantages of legitimate trade over the debasing and demoralising traffic in slaves.

Ascending the Niger to Rabbat, and leaving the steamer there, the party will, in the first instance, proceed by land to visit Sakatu,

* Spelt Kwara by Barth and by the Admiralty; Kwora by Baikie, and Quorra by old travellers.

where poor Clapperton died, and there present to the Mahomedan Sultan, to whom they are accredited, a firman from the Porte. After a short stay at Sakatu it is proposed that they should march westerly to Say on the Niger, a populous town visited by Barth in 1854, and thence descend the river by Busa in canoes and rejoin the vessel at Rabba, a tract which may, I apprehend, prove rich in mineral contents. Now, whilst parts of this region have before been traversed by the travellers Park, Clapperton, Lander, and Barth, the first of whom was killed at Busa, the country is still much too imperfectly known to be accurately mapped, though, as we have just seen, Vogel has fixed the site of some adjacent places. Still less are we acquainted with its mineral constitution.

As this expedition, well equipped and well found in provisions, medicines, and presents for the natives, will consist of 12 Europeans and 40 liberated black seamen, opportunities will be afforded of dividing the force and of exploring regions on either bank of the great river. Thus, the Government attaches great importance to the ascertainment of a safe route from Lagos and Abeokuta to Rabba on the Niger, by which the liberated Africans can return to their homes, and extend their commercial habits to the places of their birth. During the period of the next year, when the river is low and the heat great, the party is to seek high and healthy ground near the confluence of the Niger with the Chadda, where it is understood that Mr. Macgregor Laird will establish a commercial station.

When in the interior, however, the leader of the expedition is specially charged to impress upon the natives that the British Government is far from having any desire to establish colonies or settlements which might give umbrage and provoke quarrels, but is solely desirous of promoting such legitimate trade as, in enriching the natives and our own merchants, may effectually check the slave-trade.

A second rainy season will be devoted to the exploration and ascent of the Chadda or Benué, and, as the Day-Spring draws less water than the Pleiad did, it is hoped she may reach a higher point than was attained on the former occasion. It is possible that the fertile region of Adamawa, on the one hand, and Hamarrawa, on the other, may be explored, and even, if opportunity offers, that the higher part of the Old Calabar river in a more westerly meridian may be reached at some point above that to which Oldfield ascended in a steamer in 1836.

Heartily must this Society wish success to such a well-planned

renewal of our intercourse with the more civilised and Mahomedan tracts of Central Africa, which, in addition to the acquirement of important geographical and natural history knowledge, has in view the object so dear to all philanthropists, of encouraging the natives to exchange their natural productions for the manufactures of Europe, and in abandoning their warlike predatory habits to take to the pursuits of agriculture and commerce.

Having taken a deep interest in that former expedition, which, under the command of the same meritorious officer, returned without the loss of a man, I have on this occasion prepared instructions for the geological examination of a region which I apprehend may be found to contain much mineral wealth.

In fact, if the survey be completed in the manner devised, the whole western side of Central Africa will have been so traversed, as to yield two important sections, which cannot fail to give us the knowledge we desire. The Niger, or Kwara, flows in a gorge across such thick ribs of rock as must surely enable the travellers to read off a clear lesson; whilst an excursion from the upper part of the Chadda to the sources of the Calabar on the one hand, and to the heights of Aed Hamarrawa on the other, will also afford an instructive parallel traverse of no less importance.

Rejoicing that Mr. May, the Master, of the Royal Navy, who laid down the soundings and defined the banks of the Chadda, should have returned from Canton, where he has been serving, during the capture of the forts under Admiral Sir Michael Seymour, to rejoin his old companion Dr. Baikie, and confident that they will both of them do all in their power to make geological observations, I must express my regret that there should not have been some one person in this expedition, whose special duty it was to ascertain the true condition of the substrata. For, inasmuch as one great feature of the enterprise is the discovery of sources for future trade, so surely must it be of paramount value to be made acquainted with sites of coal, iron, copper, lead, and gold.

Hoping, however, that the zeal and ability of the explorers may remedy the only deficiency which is observable in the project, I cannot terminate the subject without reminding you of our deep obligations to the Earl of Clarendon for his judicious and liberal support of an exploration which, carried out as it will be by the efficient orders of the Admiralty, must not only advance our favourite science, but will also, I trust, prove a blessing to the natives, and a boon to the commercial world.

The White Nile.—M. Ferdinand de Lesseps has collected, during a recent visit to Khartúm, some information on the present state of the several European settlements along the upper course of the White Nile.

It appears, from his account, that the missionary station of Don Ignacio Knoblecher has attained considerable importance. It is situated about lat. N. $4^{\circ} 35'$, and is above the highest point reached by M. d'Arnaud. A trading establishment has been formed by M. de Malzac among the Djours, at 300 miles west of the river, and between the 6th and 7th parallels of N. latitude, where he collects ivory, and sends it down to the Nile on men's shoulders, the country being too marshy to admit of the employment of beasts of burden.

It will be recollected that, in the Address of our late President, it was mentioned that, according to the opinion of M. Brun Rollet, so long a settler in these parts, the Misselad was entitled to be considered as the main branch of the Upper Nile; but M. de Malzac dissents from this opinion, and regards the Misselad as a tributary, and not as the main river. The question must, therefore, remain an open one, until we shall have received far more accurate hydrographical data about these regions, than we now possess.

Nile Expedition.—I have to notice with regret the failure of an expedition whose object was to explore the still mysterious sources of the White Nile. Organised with method, it was liberally paid for by the Viceroy of Egypt, and placed under the charge of the Count Escayrac de Lauture, a French geographer, previously known to us by his exploration of Soudan. But disunion and want of zeal among many members of his party becoming painfully apparent, that gentleman was unable to proceed beyond Cairo. In the mean time, however, the flotilla was ordered on in advance, and placed under the direction of our countryman Mr. Anthony W. Twyford, an able and adventurous young seaman, who, overcoming all obstacles, had the singular merit of carrying two steamers, upwards of 50 feet in length, and four sailing-boats, over the first, second, and third cataracts, to beyond Dongola! * Having laid in abundance of cordage at Alexandria, and commanding, through a firman of the Pasha, a vast number of the natives (at one time upwards of 3000

* The flotilla was manned by sixty-six native soldiers and sailors, whilst Dr. Ponchet, a physician, and Mr. Clange, a photographer, were of the party. The largest of the two steamers was left at Assouan.

men), Mr. Twyford so skilfully applied his ropes to the projecting rocks, and so energetically urged on the men, that he reached Dongola in ten weeks from Cairo.

When all the difficulties had been overcome, a messenger reached Mr. Twyford, and, to his great annoyance, ordered him to return, which he did, without loss.

*Livingstone's * Researches.*—Passing now to South Africa, let us see what immense strides have been made since our last Anniversary. Our late President, then speaking of the previous achievements of Livingstone, told us that the undaunted traveller was proceeding to the East to reach the Indian Ocean at Quilimane. But how apprehensive were we that, after all his marvellous escapes, this extraordinary man might still fall a victim to the climate in which so many of our countrymen had succumbed! Great, therefore, was the rejoicing, when those letters addressed to myself arrived, in which he narrated his passage from the interior low country, across the high grounds, and along the gorges of the Zambesi, and the great falls of that river, and announced his safe arrival at the Portuguese settlement of Tete!

Still greater was our joy when he landed on his native shore to receive that hearty welcome which was sure to attend a traveller who, having accomplished such feats, brought us back so much fresh knowledge respecting the interior and flanks of that part of the great continent of which we were previously ignorant.

The outline of the travels of Livingstone is now so generally known to the public, and has been so graphically presented by himself to various assemblies of his countrymen, that any rehearsal of it on my part is wholly uncalled for; the more so, as at the Special Meeting we held on the 15th of December last, in honour of his arrival, I offered those observations which were printed in your Proceedings. Whilst the public is anxiously looking forward to the publication of the details of these journeys, which I have reason to believe will take place in about three months, I will briefly advert to one or two leading features only of them.

The hypothesis I ventured to throw out in what I termed a "Comparative View of Africa in Primeval and Modern Times," when I presided over you in 1852,† that the central regions of

* Since his return to England this traveller has changed the spelling of his name, adopting the form used by his father, and adding the e to Livingston.

† *Journal Royal Geog. Soc.* vol. xvii., Prel. Discourse, p. cxxi.

Africa would be found to be a comparatively low, watery expanse, the rivers issuing from which escaped to the east or to the west through gorges or rents in the subtending higher chains, was proved to demonstration by Livingstone, as respects that vast African river, the Zambesi.

The observations of this great traveller afford also the proof that several of the principal rivers of Africa south of the equator have their sources in comparatively level tracts of no great altitude. Just as the great rivers of Russia are separated at their sources by water-partings of such slight altitude, that Peter the Great connected these diverging streams by canals, so Dr. Livingstone has observed analogous phenomena in the heart of Africa. The African case is, indeed, still more remarkable. In this region Nature herself has made the connecting canal; for flat boats and canoes can pass northwards by the Dilolo river into the affluents of the Congo or Zairo on the west, and into the Zambesi on the east.

These humid regions, particularly towards the west side of the continent, are covered by lofty forest trees, abundance of ferns, mosses, and other plants requiring much moisture. Hence the explorations of Livingstone, opening out such new and unexpected data, induce me to put a question for solution by physical geographers. Why does it happen, that whilst moisture so prevails in $\text{lat. } 10^{\circ}$ to 15° south of the equator, the same districts equally distant from that line upon the north (as touched upon by Barth) should be arid and comparatively dry? After such positive data as those collected by Livingstone, we have indeed no longer occasion to stretch the imagination and suppose the existence of great snowy mountains from which the waters of the Nile take their rise; since we now see that the Zambesi and the Congo are supplied from marshes at lower levels than the chains through which those streams escape. The simple fact is, that in Central Africa there are two copious rainy seasons due to the periodical influence of the sun, the passage of which is accompanied by copious torrents. By the first of these rains the boggy lands become to a great degree saturated, but the water, not overflowing, finds no exit in the absence of an adequate declivity. It is only when the whole spongy mass becomes supersaturated by the second rains, that the waters rising to a great height, furnish the Zambesi with its annual flood.

In like manner the Nile may owe its annual flood to a similar cause—a point which can only be determined when our bold ex-

plorer, Captain Richard Burton, shall have informed us, whether the large Lake of Uniamesi be not the real feeder of the Nile, or if there really be lofty snow-covered mountains under the equator, as described in the distance by our missionaries.

On this latter point I confess myself to have been to a great degree incredulous ; whilst the last observations of Livingstone would lead me to suppose that the Nile, like the Zambesi, is fed from a great interior, boggy, and lacustrine region.

Again, in bringing home specimens of the white dolomitic rocks which constitute the eastern ridge, at a distance of 300 miles from the shore of Africa, and in expressing his opinion that such rocks range far to the N.N.E., or towards Kilimanjaro, the supposed sources of the Nile, Livingstone arrives at the suggestion, that the whiteness of those mountains near the equator, which the missionaries, who saw them at a distance, took for snow, may truly be nothing more than white quartz rocks and crystalline dolomitic limestones, which, glittering under a tropical sun, might well be mistaken.

Let us hope that the journeys now in progress by our clever and adventurous travellers, Captains Burton and Speke, from Mombas or Zanzibar, may settle this problem, and also determine the real nature and extent of the supposed great inland sea, on which our learned geographer Cooley has speculated, and of which the missionaries, Krapf, Rebmann, and Erhardt, have given us a rude sketch-map, compiled from hearsay testimony.

On this and many other collateral points it is not my intention to dilate ; for he who would arrive at a sound conclusion must study the writings of Cooley and McQueen, and all the Portuguese authorities, and then collate them with the practical conclusions of Dr. Livingstone, who, having travelled over eleven thousand miles of African ground, and having wandered so long among the sources of the Congo and the Zambesi, is certainly the most valuable witness we can call, when such matters are under discussion.

Great as are the deserts of Dr. Livingstone as a discoverer of new lands, or as a missionary and philanthropist, his real title to the high estimation of the Geographical Society is, that by astronomical observations he has determined the longitude as well as latitude of so many sites, hitherto entirely unknown to us, and has constructed detailed maps of those regions. On this head indeed the language which Mr. Maclear, the astronomer at the Cape of Good Hope, has

used is the most appropriate and truest eulogy which can be applied to our Medallist.*

Having observed in the character of my friend Dr. Livingstone a happy union of simplicity, patience, unruffled temper, and kindness, with the quickest perception, and the most undaunted resolution, I feel persuaded that, vast as have been his achievements, he is still destined to confer great advantages upon South Africa and his own country. His aim, when he returns to Quilimane and Tete, in the spring of 1858, or the first period of the healthy season, and after he has rejoined his old companions the Makololo, who are anxiously waiting for him, will be to endeavour to establish marts or stations beyond the Portuguese colony, to which the inhabitants of the interior may bring their goods for sale, and where they may interchange them for British produce. At these stations, which will be in those flanking, high grounds of the African continent that he has described as perfect sanatoria, he will endeavour to extend the growth of cotton, as well as to teach the natives how to till their lands, taking out with him for these intents cotton-seed, gins, ploughs, &c. He will further endeavour to bring to the English market a vegetable called Buaze, which possesses so tough and fibrous a tissue as to render it of great value even to the natives in their rude manufactures. Specimens of this plant, which grows in profusion on the north bank of the Zambesi, have been converted into a substance that has been pronounced by a leading manufacturer to be worth, when prepared, between fifty and sixty pounds per ton, and applicable to all purposes for which flax is employed. In this material, therefore, alone, to say nothing of indigo, cotton,† beeswax, ivory, and the ores of iron, with much good coal, we have sufficient indication that no time should be lost in establishing a regular intercourse with the natives of so prolific a region.

Thus, acting as the pioneer of civilisation, Dr. Livingstone will first engage the good will of the natives through their love of barter, and, having secured their confidence by honesty of purpose, he will the more readily be able to lead them to adopt the truths of that religion of which he is a minister, and of the value of which his whole life is a practical illustration.

Fortunate is it for our country that we have in the Earl of

* See Proceedings, No. VII. p. 268.

† I learn with pleasure that great success has already attended the endeavours of the philanthropists who have introduced the culture of cotton near Abeokuta, in West Africa, and its preparation for export.

Clarendon a Minister of Foreign Affairs, who not less than the noble Premier has been the consistent and vigorous supporter of every measure tending to root out the trade in slaves ; and impressed as our Government is with the desire to sow those seeds of civilisation among the natives, and probably realise the cheering prospect of a great production of the raw material necessary for our manufactures by the independent nations of Africa, let us hope that, whilst the Niger or Kwara Expedition under Baikie, to which I have adverted, is working towards that good end upon the West, the benevolent and enterprising Livingstone, already so dear to the natives, may be sent back to reside among his friends the Makololo, as the " Agent of the Queen of the people who love the Black Man."

AUSTRALIA.

Although there are grounds for believing that in the sixteenth century the Portuguese described lands which, from their position in old MS. maps, must have been Australia, our own great navigator Cook was really the first to discover, examine, and describe large portions of the coast of this vast continent.*

Afterwards remaining for a long time among the " *terre reclusæ*" of the world, this vast region, the interior of which proves to be a worthless desert,† now offers to the world the glorious spectacle of four great British colonies or separate governments on its eastern, western, and southern shores, whilst it pours forth on the old countries of Europe a shower of mineral wealth far exceeding in amount anything hitherto recorded in the history of mankind.

Thirteen years have elapsed since, as your President, I dwelt at some length upon an Australian topic, which seemed to me of paramount importance—the retention of Port Essington, and the establishment of other settlements in Northern Australia. Having lived to re-occupy this Chair, I will revert to the same theme ; whilst I crave your indulgence if I previously engage your thoughts for a few moments on another Australian subject to which I have also given some attention—the gold produce of those countries.‡

* An ingenious paper or two have been written to show that the discoveries of Cook may have been based upon a knowledge of those early documents, but in a forthcoming volume of the Hakluyt Society, our Associate, Mr. Major, will demonstrate that such suggestions are entirely fallacious.

† See Award of the Patron's Medal, p. lxxxvii.

‡ For the first printed documents relating to Australian gold, see the following Memoirs, viz.—Journal Royal Geographical Society, 1844, President's Address ; Letter from myself to Sir C. Lemon, Transactions Roy. Geol. Soc. Cornwall, 1846 ; Letter to the Secretary for the Colonies, 1848 ; Report of the Nineteenth

If New South Wales has exhibited a diminished supply from most of those tracts which first gave forth their golden abundance, and has only recently been enriched by a small additional quantity derived from a part of Bathurst county, the great coast-chain, bending to the west, and passing from the high level of the Mount Kosciusko of Strzelecki to Victoria, has proved to be charged in certain spots with an amount of gold quite unheard of in any other part of the world.*

The extraordinary rise of the flourishing colony of Victoria is the necessary result of such a vast auriferous produce, and the simple fact, that upwards of 125 tons of gold were sent to Britain in the preceding year, exclusive of local use and exportation to other countries, is so astounding, that a few years ago the mind would have been incapable of measuring the effects which such an enormous addition to the symbol of material wealth might produce upon the destinies of the human race.

Without pretending to statistical acquirements, I formerly ventured to contend that, as the scarcity of the precious metals throughout vast portions of the civilized world had long been a growing evil, and that the hoarding of a substance so easily hidden as gold would continue, and even increase, in countries having unsettled governments, so it seemed to me † that, great as the supply might be, it would not be more than sufficient to meet the demand. The dry river-beds of the old world had, in fact, to be filled up with the golden stream; and experience has now shown us how long it has taken to fill them, and how inadequately they are yet supplied.

But then comes this question. If the present annual amount of supply from Victoria and California should continue, must not a great depreciation of the precious metal follow? Now the answer must be shaped in accordance with unquestionable geological and statistical evidence. Judging from experience, all gold-veins in the solid crust of the earth diminish and deteriorate downwards,

Meeting Brit. Assoc. Adv. of Science, 1849, &c., Trans. of Sections, p. 60; Quarterly Review, vol. lxxxvii. (1850), p. 429.

* The total produce of New South Wales in 1856 was 138,823 ozs., whilst the returns from Melbourne for the same year give the enormous amount of 125 tons 6 cwt. 6 lbs., or a money value of upwards of 12 millions. My distinguished friend Sir Charles Nicholson, formerly Speaker of the House of Representatives at Sydney, informs me that there can be no doubt that gold is surreptitiously disposed of to a considerable extent (by the Chinese especially); so that the actual quantity of the precious metal produced is probably in great excess of that specified in the official tables.

† Quarterly Review, *supra*.

and can rarely be followed to any great depth except at a loss in working them. Again, as the richest portions of gold ore have been aggregated near the upper part of the original veinstones, so the heaps of gravel or detritus resulting either from former powerful abrasion or from the diurnal wear and tear of ages, and derived from the surface of such gold-bearing rocks, are, with rare exceptions, the only materials from which gold has been or can be extracted to great profit. These postulates, on which I have long insisted, in spite of the opposition of theorists and schemers, have every year received further confirmation, and seem, on the whole, to be so well sustained as matters of fact, that the real problem we have now to solve is, How much time will elapse before the gold of Australia is finally riddled out of these heaps or basins, or extracted from a few *superficial* veinstones?

It would indeed be presumptuous in any one who had not closely surveyed the rich auriferous tract of Victoria to pretend to answer this question; but I beg my associates to understand, that there is a wide distinction between the measurable capacity of the contents of these broken heaps, or rare thin veinstones *in situ*, and those imaginary mountains with bowels of gold of the theorist, the very thought of which has shaken the nerves of so many fundholders. For, it must be remembered, that all the accumulations of broken golden materials, or the great sources of supply, have well-defined bottoms. They are, in fact, troughs filled in with gravel or shingle, the cubical contents of which, when the country has been thoroughly surveyed, can be computed: and though it may never be possible to predicate the amount of ore contained in all parts of such slopes or hollows, yet, judging from the rate of excavation now going on, a good geologist like Mr. Selwyn, who is conducting the survey in Victoria, may well be able to give us approximate data as to the probable number of years required to empty out the metalliferous fragments from all those troughs or basins in which they have been detected.*

The other sources to which I have alluded, I learn from Mr. Westgarth, an intelligent resident of the colony, have however of late been worked to some profit. These are the narrow veinstones of quartz rock, two or three feet thick, which at the surface are rich in

* A certain amount of the gold of Melbourne, whether occurring in drift or finely levigated clay, is reached by sinking shafts through basaltic coulees, which have evidently flowed in recent times, since they cover woody substances, including cones which, though in a charred or brown-coal condition, have been recognized by Mr. Robert Brown, as belonging to the remarkable Australian living genus, the *Banksia*, which that great botanist was the first to find and describe.

gold, and which have also been partially worked in California; and so long as the miner is near the surface, these veinstones will unquestionably well repay the cost of working them. When, however, they are followed downwards into the body of the rock, they have usually been found impoverished, either thinning out into slender filaments, or graduating into silver or other ores; so that these insulated thin courses of auriferous quartz—mere threads in the mountain masses—will soon be exhausted for all profitable purposes, when the upper portions shall have been quarried out.

But whatever may be the duration of the gold produce, Victoria has already become a wealthy colony, whose agriculture and commerce have risen to a pitch which will ensure her future greatness, even should the period arrive when her rich golden harvests are no longer to be gathered.

Nowhere in the annals of mankind has there been known so wonderfully rapid a rise, as that which has taken place in and around a spot which, surveyed only a few years ago, was first formed into a separate colony in 1837. In each file of the well-written periodicals of Melbourne, we see pregnant proofs that this spot is already one of the great centres of the world's commerce, and is inhabited by an intelligent and advancing people, well worthy of the parent stock.

The latest accounts from Western Australia, given in the detailed explorations of it, as published in our Proceedings, afford little hope that our colonists are there to be enriched by mineral wealth; the great saline desert which Sturt tracked from south to north, and Eyre travelled upon coast-wise on the south-west, having been met with at several points by Gregory and Austin. Again, rich as is South Australia in her Burra-Burra copper-mines, no material quantity of gold has yet been detected in that colony, notwithstanding some vigorous searches, among which those of Mr. Herschel Babbage have recently been brought to your notice.

Turning, then, from that knot of elevations which, forming the background of Victoria, are so prolific in gold, and exploring that long Eastern Cordillera which leads from New South Wales to the Gulf of Carpentaria, though we may meet at intervals with an auriferous patch or two to entice the explorer northwards, the real incitement to new settlers is found in the rich soil and the good herbage they fall in with, as they extend civilization northwards. Thus, from the clear and accurate survey of the vast Peel River settlements by that sound mining geologist, M. Odernheimer, we now

know that no valuable amount of gold is to be found there, either in the loose débris or in the solid rocks. Independently, however, of gold, the northern progress of civilization, as far as skill and energy can aid it, will assuredly be secured upon a solid basis by the present enlightened Governor-General Sir W. Denison.

The exploration of that eastern Cordillera, so long ago undertaken by our enterprising associate Count Strzelecki, to which I specially directed your attention in 1844, and which has since been carried further out by Leichhardt, Kennedy, and Mitchell, has recently had its northern and north-western offsets brought more definitely into notice by Gregory and his associates.* The advanced guard of the colonists has now even crept on so far beyond Moreton Bay, as to be already within about 560 miles of the head of the Gulf of Carpentaria; and judging from the fertile nature of most of the unoccupied lands, the period is doubtless not very distant when our countrymen will reach that great haven, which, penetrating for 500 miles into the continent, will surely, in future ages, be crowded with ships carrying on a great commercial intercourse between Australia and the Eastern Archipelago, Hindostan, and China.

Looking to that future, and even to our present interests, it was a subject of regret to many of us, that it should have been thought expedient to discontinue the occupation of Port Essington, and to abandon all intention of holding any other station along the northern coast of this vast continent. Unable now to enter upon a consideration of what bay of the eastern side of the Gulf of Carpentaria may be selected as an "entrepôt," I have little doubt that the time will soon come, when all minor difficulties will disappear before the energy of British colonists, in their endeavours to connect their Australian possessions with the rich marts of the Eastern hemisphere.

In treating this subject there is, however, another point which seems to me of such incalculable national importance, that I must beg your permission to say a few words upon it. If the idea of forming settlements through convict labour is to be discarded as respects the Gulf of Carpentaria, because the free population of New South Wales is advancing towards that great haven, then let us turn to that noble bay upon the north coast, of which Cambridge Gulf forms the western side, and whose eastern side receives the waters of the Victoria River. First explored by Philip King in

* Award of the Gold Medals, *ante*. No auriferous tract appears to have been discovered by Mr. Gregory's party.

1819,* and by Wickham and Stokes in 1839, the basin of the Victoria was recently the scene of the encampment of Gregory, whence he extended his researches southwards to the saline desert, and eastwards to the Gulf of Carpentaria. The real opinion of such an experienced colonist and geographer (whose merits have been already dwelt upon in conferring upon him our Founder's Gold Medal) is of infinitely greater value than those speculations which would describe the whole of that region, on account of its latitude, as unfit for the settlement of the Anglo-Saxon race! The plain answer to this view is, that on the banks of the navigable river Victoria, the party of Wickham and Stokes were perfectly healthy in 1839; and that recently our countrymen were stationed there for nine months without the loss of a man. Our medallist Mr. Gregory, after a residence of many years in Western Australia, has thus written to his friend, the former Governor of that province:† “This portion of Australia far surpasses the western coast both in its fertility and extent, and its capabilities for settlement. Good harbours are numerous along the coast, and there is abundance of fine country for stock and cultivation.” Again, he says: “The valley of the Victoria far exceeds the best parts of Western Australia both in fertility and extent.”

Let us also hear what Dr. Ferdinand Mueller, the botanist of the last expedition, says. This gentleman, who, by his Australian researches, has, according to Sir W. Hooker, placed himself in the front rank of botanists, having collected in tropical Australia about 1500 species of plants, of which 500 are new, thus writes to his friend Mr. C. Latrobe, the former Lieut.-Governor of Victoria:—“North Australia, with the exception of the east coast, possesses essentially a *dry Australian*, and not a *moist Indian climate*. *Fevers do not therefore exist*, and we escaped such jungles and swamps as those in which Kennedy's party exhausted their strength. There

* As these pages are passing through the press, my valued friend Dr. Fitton called my attention to his Appendix to the Voyages of that admirable surveyor the *clive* of Flinders, Capt. Philip P. King, along “Intertropical and Western Australia” (1826). I have communicated the letter of this eminent geologist to the Society, and the readers of our Journal will see in it an able effort to derive generalizations from the examination of specimens collected by King and the trend of the rock masses.

These descriptions of King and Fitton should be compared with those of Grey and Lushington, who in 1837 examined that portion of the north coast between Prince Regent River and the Glenelg, and also with the more recent observations of Mr. J. Beete Jukes, as given in his work entitled ‘Sketch of the Physical Structure of Australia’ (1847).

† Captain Fitz Gerald, R.N.

is abundance of good country in North Australia, and, with access for vessels to the lower part of the Victoria, full scope for the formation of a new colony. But as a new settlement can scarcely be formed in such a remote and certainly hot part of the globe without prison labour, against which the public mind is turned with such decision, and as, without great inducements, the squatters will find it for a long time unprofitable to migrate in this direction, I fear that the pastures of North Australia will yet be left flockless for a long time.”*

With such facts before them, it is possible that our Government may see that this prolific and healthy region, *so remote and so entirely cut off by the great interior saline desert from all our established colonies, that no intercommunication can possibly take place*,† is, notwithstanding its summer heats, a perfectly fit and proper receptacle for our convicts, whose labour there would completely repay their cost of maintenance. When our prisons are crowded, and crime is rapidly augmenting with our increasing population, it does indeed seem desirable to seize upon such a zone of exile as is here offered, and, by removing worthless characters from our land, render them really useful in occupying the only coast of that continent on which the British flag does not now fly, though it has been there twice unfurled. But I forbear to press this feature of a topic which can be better handled by politicians; and all I venture to urge is, that, whether by forced‡ or free labour, North Australia should be colonised.

When presiding over you in 1844, and in then expressing an opinion from the best authority§ that, if our Government would

* Mr. Elsey, the surgeon of the expedition, who has reached London whilst this Address is passing through the press, completely confirms this view of the productiveness and healthiness of the region.

† See Grounds of the Award of the Patron's Gold Medal to Mr. Gregory, and a description of these tracts.

‡ It has indeed been stated, that the inhabitants of the free colonies of Australia protest against any further transportation to that continent. Now, a resident of Victoria in S. Australia might with as much consistency declare that there should be no penal settlement in any part of the world, as that the *Victoria of North Australia* should not be so first settled through convict labour; for the great interior saline desert more completely separates the northern from the southern region of Australia than any sea. That desert is utterly impassable by human efforts, and any convict who should escape from Victoria River or Cambridge Gulf would have to find his way by upwards of 4000 miles of sea voyage before he could reach Melbourne! It is indeed extraordinary that in the debates upon this subject, no allusion has been yet made to Cambridge Gulf and the rich basin of the Victoria river. See Debates H. of Commons, May 15, 1857, when Mr. Baxter quoted the Melbourne Correspondent of ‘The Times.’

§ Journal Roy. Geogr. Soc., vol. xiv., President's Address, p. xcvi.

render Port Essington a permanent and independent colony, rich mercantile houses would at once set up establishments there, and freight large vessels to trade with the Eastern Archipelago and China, I wrote in the full conviction that, even if that particular station should be abandoned because it was exposed to tornados, other sites could be selected in a region, which so many experienced naval officers and other authorities have eulogised as offering capacious harbours and a climate not unsuited to Europeans—lands in which the pastures are magnificent, whilst the sea swarms with the finest fishes.

In the face, then, of these evidences, is the state of indifference of our country to North Australia to continue? Is Britain not to commence the formation of a settlement, whether by penal servitude or free labour, in the fertile basin of the northern Victoria or elsewhere, and thus secure future entrepôts for her commerce? What better guarantees can be had that success would follow, than the fact, that in the worst and most exposed part of this region (Port Essington) a British garrison was in a healthy state for several years, and that in its more southern portion the explorers in two expeditions have equally preserved good health?

Lastly, looking to the future destinies of our country, is it to be forgotten, that France has recently taken possession, not only of that New Caledonia which our own Cook discovered and named, but also of the Isle of Pines, where our colonists from Sydney carried on a trade in sandal-wood, and has thus acquired a “point d’appui” on the eastern flank of our largest Australian colony?

Or, ought we to close our eyes to the vast importance not only of securing good harbours of refuge in Northern Australia, but also of there establishing naval stations, which would prove invaluable for steam navigation, and where, in the event of war, our fleets may rendezvous, and thence move directly upon the flank of any enemy, who might be operating against our Eastern trade and possessions?

In short, it is scarcely possible to point to any region of the globe where British occupation is so imperatively called for, whether as a precaution, or with a view to future commercial interests. Expressing, then, an earnest hope that a settlement may be soon established on the banks of the Victoria, and in the adjacent Cambridge Gulf, and believing that great national advantages must follow, let us trust that, if such a consummation be attained, the proposers of it may not be forgotten, and that it will be remembered that the last

North Australian expedition, now happily completed under the direction of Her Majesty's Government, was a child of the Royal Geographical Society.

NORTH AMERICA.

British Possessions.—The gradual advance of civilized man towards the remoter regions of North-western America, has long drawn the attention of geographers to those extensive tracts, still distant from the settled country, which afford an almost undisturbed asylum to the aboriginal population of the continent. It would scarcely be credited, that within the limits of British America, a region including at least 112,000 square miles, extending from the head waters of the Assiniboine River to the foot of the Rocky Mountains, and from the northern branch of the Saskatchewan to the 49th parallel of latitude, our boundary with the United States, has remained almost completely unexplored.

The comparative scarcity of fur-bearing animals in this portion of the territory of the Hudson Bay Company, the warlike character of the Indians, and other causes, have alike contributed to prolong our ignorance of lands which may, at no distant time, become the home of thousands of our countrymen.

Mr. Palliser, a traveller, who had already spent a considerable time in the neighbouring districts of the Upper Missouri, and whose adventures as a sportsman form the subject of a popular work, conceived the project of employing two years in the exploration of the tract to which I have referred, along with the adjoining portion of the Rocky Mountains.

Mr. Palliser's original intention was, as I have understood, to undertake this journey at his own expense and with no other companions than those whom he might engage as voyageurs and hunters to join him in traversing the Indian territory. Having, however, addressed himself to our Secretary, his proposal was at once brought before the notice of the Council, by the direction of which it was referred to our Expedition Committee and fully discussed. In consequence of this a letter was directed by myself on the 6th of January to the Right Hon. Henry Labouchere, the Secretary of the Colonies, in which the Council strongly advocated the exploration of that portion of British North America between the parallels of 49° and 53° N. latitude and 100° to 115° W. longitude. The chief objects of the exploration were then stated to be—

- 1st. To survey the water-parting between the basins of the

Missouri and Saskatchewan; also the course of the south branch of the Saskatchewan and its tributaries.

2nd. To explore the Rocky Mountains, for the purpose of ascertaining the most southerly pass across to the Pacific, *within the British territory*.

3rd. To report on the natural features and general capabilities of the country, and to construct a map of the routes.

Mr. Palliser's experience, his success in conciliating the good will and respect of the Indians, and his anxiety to make his journey conducive to the increase of scientific knowledge, pointed him out as well fitted to be the leader; but it was evident that without the aid of fellow travellers trained to accurate research and accustomed to the use of scientific instruments, no very accurate results could be expected from the expedition.

After considerable discussion, the Lords of the Treasury consented, on the recommendation of the Secretary for the Colonies, to submit to Parliament a vote of 5000*l.* for this purpose, on the understanding that all the collections and results of the expedition should be placed at the disposal of Government.

Three scientific gentlemen have been since appointed to the expedition—Lieutenant Blakiston, of the Royal Artillery, on the recommendation of the President of the Royal Society, to conduct the astronomical and physical observations; Mr. Bourgeau, an experienced and successful botanical collector, selected by Sir William Hooker, the Director of the Royal Garden at Kew; and Dr. Hector, a medical gentleman recommended by myself on the score of his geological and zoological acquirements, as well as for his general fitness to contribute to the objects of the expedition.* Mr. Palliser is, moreover, himself conversant with the use of the instruments which have been supplied by Government, and has the advantage of an experienced assistant as his Secretary; so that the important object of determining the geographical position of the points visited by the expedition has been amply secured.

The instructions given to Mr. Palliser by H.M. Secretary of State direct, that the journals of the expedition, together with the records of the observations, shall be made out in duplicate, and that one copy shall be transmitted to England, from time to time, as oppor-

* General Sabine has instructed Lieutenant Blakiston in making magnetical observations, a Committee of the Royal Society furnished the necessary instructions in physical science, and the geological suggestions were supplied by myself.—R. I. M.

tunities may occur. An assurance was also given that the journal of the expedition shall be regularly communicated to this Society, according as it shall be received at the Colonial Office.

The departure of the expedition was somewhat delayed by the severe illness of Mr. Palliser, but he sailed with his companions on the 9th of May, and information has been received of their arrival at New York in good health and with their instruments in working order.

During the present season it is intended that they should proceed from Fort William on Lake Superior to Lake Winnipeg and Fort Garry, examining *en route* some portion of the watershed between Lake Superior and Rainy Lake. From Fort Garry the expedition will proceed westward to the head waters of the Assiniboine River, and will explore some portion of the country between the southern branch of the Saskatchewan and the boundary of the United States, turning to the northward to winter at Carlton House Fort.

The summer of 1858 is to be employed in traversing the country of the Blackfeet and Blood Indians, between the two branches of the Saskatchewan, tracing the southern branch to the foot of the Rocky Mountains, and in endeavouring to settle the disputed question as to the existence of a practicable pass in the chain, between the Kootaine Pass south of the 49th parallel, and the Pass between Mount Brown and Mount Hooker, more frequently used by the servants of the Hudson Bay Company.

Apart from the public interest which belongs to the exploration of a large and important portion of British territory, it is impossible not to anticipate valuable additions to natural science from the united labours of the members of this expedition, and to feel proportional satisfaction, that Government should have seen the propriety of complying with our recommendation by fitting it out in an efficient manner.

Let me add, that the establishment of a direct line of intercourse between our Canadian possessions and Vancouver Island, which being 250 miles in length, contains good ports and valuable coal-seams, is not the least important of the national interests connected with this survey.

United States.—The omission at our last anniversary of the progress made in the Coast Surveys of the United States was owing to the circumstance that the Reports of it had not been received. Since that date, however, the Society has received from Professor A. D. Bache, the Superintendent of the Coast Survey, the Report

for 1854 of the progress of the department under his very able guidance. This great work has been so often mentioned with praise in former Addresses from this chair, that it is unnecessary for me to do more than direct the attention of all geographers to the continued activity and effective practical efforts of Professor Bache and his assistants.

The report on the United States Coast Survey for 1855, has, I regret to say, not yet been received. I hope, however, at our next Anniversary, to be enabled to do full justice to the advances in this department, and the other branches of geographical science which are in progress in the United States.

The eighth volume of the excellent 'Contributions to Knowledge' published by the Smithsonian Society has been received, and comprises most valuable papers by Mr. S. F. Haven, Professor Olmstead, Major Alvord, Dr. Jones, and Mr. Torce, to which I beg particularly to refer.

The American Geographical and Statistical Society—established at New York in 1854, under the presidency of the celebrated historian Bancroft—has now become a numerous and important body. I refer with gratification to one of the pamphlets which this Society has recently published, entitled 'A Report on Recent Discoveries in Sub-Oceanic Geography.' Referring to the data gathered by our Associate, Lieutenant Maury, in the Hydrographical Department at Washington, this Report as put forth by Mr. W. H. C. Waddell, U.S.N., points to the observations of Commander Rodgers, on the temperature and specific gravity of the waters of the Arctic Ocean at various depths; showing that near the surface the water is warm and light, at mid-depths cold, and at the bottom warm and heavy. This discovery, it is inferred, furnishes the only link that seems to have been wanting to complete by facts, the theory of open water in a really polar sea, as originally suggested by General Sabine, and as since supported by De Haven, Kane, and other Arctic voyagers.

Then, again, the deep-sea soundings of Lieutenant Brookes demonstrate that the most profound repose prevails at vast depths, the bottom being found to be of a down-like softness, and composed in most parts of the skeletons and casts of microscopic shells and infusoria.*

* The details of the zoological results afforded by these operations between America and England, as conducted by Lieutenant Berryman, are reserved for future publication.

These observations, so important to the physical geographer, mariner, and naturalist, when combined with the experiments of Professor Morse, led the way to the formation of a company to construct that wonderful telegraphic cable of which I have elsewhere spoken, whilst the wind and current charts as registered in the United States have enabled speculators to select the best line for paying out the electric cord, which, scarcely thicker than a finger, is to connect the New World with the Old.

I must further refer you to the Report of the American Geographical Society for most curious information, as derived from the microscopic examination by Professor Bailey of West Point, of certain unabraded particles brought up from vast depths, which being ashes of volcanic origin, afford fine scope for the speculations of the geographer and geologist respecting the currents by which such materials may have been carried to their present tranquil abode.

One of the most striking works which the American Government has published in the last year is Commodore Perry's 'Narrative of the Voyage of the Squadron under his orders to China and Japan.' This work is replete with valuable geographical and ethnographical notices of the tracts visited, and is illustrated by many explanatory maps and lithographs. It was transmitted to us by that eminent scholar of the United States my friend Mr. Edward Everett, so justly valued by every man of science and letters in our country.

The question of the priority of discovery of the Bonin Islands, so amicably discussed between Commodore Perry and my predecessors the Earl of Ellesmere and Admiral Beechey, has, I trust, at length been settled by the memoir on those islands published in the last volume of our Transactions.

Geographical progress in the United States has been farther marked by the production of two maps of North America by the distinguished geologist Professor Henry Rogers, as brought out by Mr. Keith Johnston, of Edinburgh. One of these is purely a geographical map, on which the strait boundary lines of the different States, as marked by strong colours, necessarily interfere with the natural features of the country. The other, on the contrary, being a geological map, is a representation of ancient nature, in which the author's peculiar talents shine forth: and the masses of land, independent of the shackles which the interests of man have imposed upon them, stand out in all their simplicity.

Our library has also been enriched since the last Meeting with

a work by Captain Randolph B. Marcy, of the U.S. 5th infantry, on his exploration of the Red River of Louisiana, in which he was assisted by Captain George B. McClellan, of the U.S. Engineers. The book is accompanied by reports on the natural history of the territories visited by the expedition, and also by two valuable maps of the country between the frontiers of Arkansas and New Mexico, and of the tract embraced within the basin of the Upper Red River.

Mr. J. G. Kohl, the industrious labourer in the field of statistical research, whose works on Russia and other countries have obtained for him due consideration, has now entered upon the illustration of the geography of America, and, as a prelude to labours which he hopes will be found useful, has just published a little treatise under the title of a 'Descriptive Catalogue of those Maps, Charts, and Surveys relating to America, which are mentioned in Hakluyt's Great Work.'

Though the last session of Congress was the short one, or from December to March only, the subject of geography was not neglected. Adequate grants of money were made for the publication of the surveys of the Expedition to the North Pacific Ocean and Behring Strait, and for finishing the publication of the Charts made by the late Expedition for the Exploration and Survey of the River la Plata and tributaries, as well as for an Exploration of the Paraná and the tributaries of the Paraguay River.

I am also informed that towards the verification of the Survey of the Atrato and Truando Rivers in New Granada, as proposed by Mr. Kelley (see last Anniversary Address, p. cxxii.), for the purpose of making a ship canal between the Atlantic and Pacific Oceans, Congress has liberally granted 25,000 dollars. It has also, I am happy to say, been intimated, that the Governments of Great Britain and France are not unwilling to assist in this very important preliminary Survey.

CENTRAL AMERICA.

The communication by canal between the Pacific and Atlantic, to which my predecessor called attention, has a much better chance of being investigated, now that all the states of Europe are at peace, and that the most friendly relations possible exist between the Governments of the United States and Britain.

The Proceedings record how favourably the project of Mr. Kelley of New York was entertained by this Society, and show how deep an interest we take in realizing the early anticipations and wishes

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of the illustrious Humboldt. I can only say that no exertion on my part as the President of this Society shall be wanting, to support any proposal which may be made to bring about such a simultaneous and conjoint Geographical Survey made by the Governments of Britain, France, and the United States, as shall definitively settle the points at issue, and demonstrate whether or not it be practicable to execute a great inter-oceanic canal.

SOUTH AMERICA.

New Granada.—Captain Battersby, who has been lately travelling in New Granada, strongly advocates the superior commercial advantages of the River Atrato over the Magdalena as a channel of communication, not only with the people on the upper waters of that stream, but with those of the extensive districts bordering the Cuenca, and of the cities of Antioquia and of Cartajo, the population of which alone he estimates at 30,000; expressing his belief that ere long the traffic on the Atrato must be carried on by steamers, and that then the Gulf of Darien will become the centre of nearly all the commerce of New Granada.

It appears that, in the course of the last year, two steamers, drawing 7 feet water, did ascend the river as high as Quibdo, the capital of Choco. British goods destined for that place are now sent round Cape Horn to the Bay of Buenaventura, and have to be carried thence on mules across the Andes.

Chile.—M. Plessis has completed his map of the province of Santiago de Chile, coloured geologically, a copy of which has been received by the Society, through the kindness of Mr. Bartholomew, who has engraved it.

Those who wish for the latest data on the geographical and other statistics of that section of South America will find them in the *Anuario Chileno*, a yearly publication which contains much useful local information, and in the *Anales de la Universidad*, another periodical, principally edited by M. Domeyko, a well-known geologist and good observer.

Peru and Bolivia.—Mr. Bollaert, our associate, has drawn attention to the existence of a statistical account of *Peru*, published in Lima by Don J. M. Cordova y Urrutia; as well as to a similar work on *Bolivia* by Don José Maria Dalence of Chuquisaca; both of which, if translated, he thinks might be useful to parties interested in those countries.

Rio de la Plata.—Lieut. Page's preliminary Report has been pub-

lished '*On the Exploration and Survey of the Rio de la Plata and its Tributaries*,' noticed in Admiral Beechey's Address last year.

The United States' steamer *Waterwitch* was employed on the service in question for more than three years, during which the Paraná and Uruguay, the principal affluents of the Plata, were explored, and the river Paraguay ascended as high as the Brazilian fort of Coramba, in lat. 19° S. From that point the further progress of the vessel was not permitted by the ruling powers, much to the disappointment of Lieut. Page, who hoped to have led the way in opening a communication by steam for the first time with the rich provinces of Matto Grosso and Cuyaba, on the higher waters of this magnificent river.

There must, doubtless, be a great mass of new information to be collected respecting those countries which, under the Colonial rule of their old masters, were closed to all the rest of the world; and we cannot, therefore, but join in anticipating a rich harvest of interesting matter respecting them whenever the further details of the expedition shall be published in extenso, as no doubt they will be ere long, conformably to the liberal and enlightened practice of the Government of the United States.

It is, however, but due to others, when treating of this subject, to mention that the rivers Paraná and Uruguay have been already very carefully surveyed by our own officers, and that Captain Sullivan's admirable charts of them, upon a large scale, were long ago published by the Admiralty under the superintendence of that eminent hydrographer Sir Francis Beaufort.

Those rivers, as well as the Paraguay throughout its course, had been also previously mapped (and, it may be inferred, with some accuracy) by commissioners eminently qualified for the purpose, who had been chosen by the Courts of Spain and Portugal to settle and define their respective rights and limits, in virtue of the treaties of 1750 and 1777, and whose labours on the last occasion extended over a period of no less than twenty years.

The portion of them best known, perhaps, is that connected with Paraguay, in which every place of any importance was fixed by astronomical observation, as may be seen in the well-known work of Azara, who was one of the Spanish commissioners.

Copies of many of the maps of that part of this grand survey were purchased some time ago by the British Museum, and may be referred to in the MS. Department.

The most important result of Lieut. Page's expedition, as yet

made known, is the exploration of the River Salado, a tributary of the Paraná, with the evidence adduced of its being navigable in the greater part of its course through the upper provinces of the Argentine Confederation. This has been since verified to a considerable extent by the passage down the river of a boat from Matará,* in the province of Cordova, to Santa Fé, on the Paraná, under the personal guidance of Don Antonio Taboada, a brother of the Governor.

M. Amedee Jaques, a French gentleman, who joined Lieut. Page in his journey into the interior, to explore the course of this river, has published in the '*Revue de Paris*' (last March) a highly graphic account of the personal adventures of the party, and of a bloody conflict they had with the wild Indians in the Chaco.

Coast of Patagonia.—Mr. Bragg, an English engineer employed at Buenos Ayres, has discovered and surveyed a good port and roadstead near the old settlement of the Jesuits, in the vicinity of Cape Corrientes, to the south of Buenos Ayres, which had hitherto escaped notice, but which is likely to be of some importance as a place of export for the produce of the adjoining districts. The details respecting it have been forwarded to the Hydrographer of the Admiralty.

Orinoco.—At the commencement of the present year, a proposition was laid before the Society by Admiral Sir Charles Elliot, late Governor of Trinidad, for the resumption of Humboldt's scientific investigations on the Orinoco and its affluents.

The prospective estimate formed by the illustrious philosopher of the advantages to be anticipated from the junction of the Tuamini, a branch of the Orinoco, with the Rio Negro, which falls into the Amazon, together with his more earnest advocacy of the importance of the navigation of the Meta, unquestionably place this suggestion in a very favourable light. The region drained by the vast water-system of the Orinoco is described by Humboldt as "*enrichi des productions les plus variées*;" and though we may no longer look for the fabled El Dorado of the adventurous Raleigh, the hope may yet be indulged that, by exploratory enterprise and the judicious application of steam navigation, a real El Dorado may yet be founded in this fertile portion of the western world. Nor can I here refrain from an allusion to the valuable edition by our dis-

* Sir Woodbine Parish, in the first edition of his work on those countries eighteen years ago, mentioned that the Salado was known to be navigable as high as that place (Matará), and that if it were used, there would be an enormous saving of land carriage in the conveyance of goods from Buenos Ayres to Santiago in the interior.

tinguished medallist Sir Robert Schomburgk, formerly her Majesty's Commissioner to survey the boundaries of British Guiana, of the "Discovery of the Empire of Guyana by Sir Walter Raleigh," printed for the Hakluyt Society in 1848. Having himself explored what he describes as "the wondrous delta of the Orinoco," Sir Robert was able to enter, with the fullest intelligence and zeal, into the reproduction of those elegant descriptions by Raleigh which he had read with so much delight. These early narratives not only charm us by the quaint and nervous language in which the manly exploits of our ancestors are related, but frequently record discoveries or assert important truths which, from those distant times, lie dormant or are regarded as fictions, until accident or science unfolds anew, to the adventurer of the present day, the secret of their existence. I may mention, by way of illustration, an instance of the manner in which a fact of the greatest moment to the interests of the world may thus lie buried for more than two centuries and a half after its distinct announcement by one of our most distinguished early travellers. In the "World encompassed by Sir Francis Drake," edited for the Hakluyt Society by our associate Mr. Vaux, we find it said of California, which then received from Drake the name of Nova Albion, "There is no part of earth here to be taken up wherein there is not some special likelihood of gold or silver." This voyage of Drake's was made in 1578, and it was not till 1848 that the whole world was astounded by the discovery of the Californian goldfields.

Observatory of Santiago.—"The astronomical geography of positions (Baron Humboldt writes to me) has made progress through the useful establishment of the observatory of Santiago de Chile, founded during the residence of the able astronomer Lieut. Gilliss, of Washington. The Director of the Observatory of Santiago, M. Moesta, has found the difference of longitude between Santiago and Greenwich 4h. 42' 32".4 in time, probable error 3".2.

"M. Moesta thinks, that all the west coast of South America is 17" too much to the west on the best maps. I had found that Callao de Lima was 5h. 18' 16" west of Paris by the passage of Mercury over the solar disc; now Admiral FitzRoy finds the difference of longitude between Valparaiso and Paris 4h. 50' 6".6; and that between Callao and Valparaiso by means of chronometers 0h. 22' 8".4; so that Callao would be 5h. 18' 15" west of Paris, which coincides to within one second of time with the result of the observation of the passage of Mercury observed by me—an accuracy probably accidental. Admiral Beechey has repeated the calculations of Herz and

FitzRoy, showing that the difference of longitude in time between Valparaiso and Paris is $10^{\circ}4'$ in excess. Callao, therefore, would be only $5\text{h. } 18' 4^{\circ}6'$ to the west of Paris. The passage of Mercury, however, over the solar disc, which was observed on the 4th of May, 1832, at Lima by Mr. Scholz, again gives for Callao $5\text{h. } 18' 13^{\circ}7'$ west of Paris—supposing the chronometrical differences between Lima and Callao, which I published in the second volume of my *Astronomical Observations*, to be correct. The electric telegraph, established in May, 1855, has given $0\text{h. } 3' 56^{\circ}5'$ for the difference of longitude between Valparaiso and Santiago. M. Moesta, therefore, places Valparaiso in $4\text{h. } 55' 49^{\circ}5'$; and I and FitzRoy $4\text{h. } 56' 6^{\circ}6'$."

After this clear and succinct analysis of so valuable a geographical datum, obtained through an expedition of the United States, the veteran philosopher concludes in these words: "And thus this long endurance of life (*cette patience de vivre*) has enabled me to witness all these rectifications." *

In looking to the general configuration of South America, I am further reminded by Baron Humboldt, that the trachytic regions form insulated bands in the Cordillera, such as the volcanic Sangai, to the S.E. of Quito, which is constantly throwing out incandescent scoriæ, like those of Stromboli. This insulated trachytic mass, which has a diameter of 45 English miles only, rises out of a granitic and gneissose plateau 16,070 French feet above the sea, thus presenting an analogy to the structure of the Thian Chan in Central Asia.

* Having been made acquainted by my friend Mr. Pentland with data respecting Admiral Beechey of which I was ignorant, it is due to the memory of my lamented predecessor to state, that in a letter to Admiral Krusenstern, he fixed the longitude of Valparaiso by independent astronomical observations at $4\text{h. } 46' 37^{\circ}6''$, only differing $8^{\circ}6'$ from that deduced by Moesta's observations; and as the latter are probably $3^{\circ}7'$ in error, it follows that there may be little more than one mile between his result and that of Admiral Beechey."

The position adopted on the Admiralty Charts, and in Lieut. Raper's elaborate Tables of Positions, has been deduced solely by means of chronometers during Admiral FitzRoy's surveys; the latter officer having made few absolute astronomical observations: whilst his chronometrical data are entitled to the greatest degree of confidence.

I am also informed by Mr. Pentland, that he having made independent observations, similar to those of Admiral Beechey (moon culminating stars) at stations referred trigonometrically and chronometrically to places on the coast, he found for the latter, longitudes agreeing with those deduced from the position of Valparaiso, as determined by my distinguished predecessor. Thus the position of Arica deduced by Mr. Pentland from observations made at La Paz, and carried on by a series of triangles and chronometers to that place, is identical with that deduced from Beechey's longitude of Valparaiso carried on by FitzRoy's chronometrical chain to the Peruvian port.—R. I. M.—*1st Aug.* 1857.

* See *Journal R. G. S.* vol. ix. p. 502: also Daussey's *Positions Géographiques*, 1842 p. 67, &c. F D

FINAL ARCTIC SEARCH.

When I last addressed you as your President in 1853, it was still my hopeful task, as in the previous year, to urge the Government and the country to send out another expedition in search of my old and honoured friend Franklin and his crews. I then congratulated you upon fresh expectations having been raised by the successful voyage of Lady Franklin's little vessel, the *Isabel*, under Inglefield, and also in anticipation of good results from the large public expedition under Belcher and Kellett. Alas, we know too well what fatalities interfered with the solution of the great problem, so clearly recorded last year by my lamented predecessor. Since this Address was delivered, the light which had been thrown upon the subject, whether by the information and memorials brought home by Dr. Rae, or the exploration down the Back River by Dr. Anderson, has rendered me still more anxious to ascertain the real fate of the *Erebus* and *Terror*, and their gallant crews. Through the unexpected tidings communicated by our medallist Rae, we were no longer allowed to speculate on the course followed by Franklin; the "whereabouts" of the journeyings of some, at least, of our missing countrymen being for the first time made known. Had these traces been discovered two years sooner, what efforts would not have been saved to Great Britain and America! All the endeavours of Belcher and De Haven to penetrate northwards by Wellington Channel, as well as those of Kellett to communicate by a north-western course with Collinson and McClure, and the almost superhuman struggles of Kane to reach a Polar basin—all these might have been averted! The daring efforts to penetrate with ships through the intricate channels which separate the great islands of the Arctic Archipelago would have been stopped by that one fact, and the Government would have known how to dissipate at once the mystery which still hangs over the fate of the missing vessels and a large portion of their crews.

Is it, therefore, to be wondered at that many men of science willingly signed a memorial,* beseeching the Government to make a final endeavour to search efficiently the area, at the edges of which

* This document, which was prepared by myself, the list of subscribers being headed by Admiral Sir F. Beaufort and General Sabine, was most kindly received by Lord Palmerston in June, 1856, a month after the last Anniversary of this Society. My predecessors, Lord Ellesmere and Admiral Beechey, were among the subscribers, as well as Lord Wrottesley, who in his last Anniversary Address to the Royal Society handled the subject with great effect. See *Proc. Roy. Soc.*, No. IV.

the relics were discovered, and where the Esquimaux reported, that some of the wanderers were last seen? I regret to say that notwithstanding the kind consideration of the Prime Minister, and the hopes we were led to entertain, the limited search asked for has been withheld, and Lady Franklin has once more been thrown upon her own resources, to terminate that inquiry which my friends and associates felt it to be the duty of the nation to complete.

The intense feeling displayed on this subject by our kinsmen the Americans has been demonstrated by the strenuous efforts made by their Government as well as by Mr. Grinnell. In 1853 I rejoiced with you in learning, that this liberal philanthropist was about to renew with his own funds another Franklin search, and that Kane was about to sail on such a voyage. That noble young man, as I have already shown, extended far the northern limits of Smith Sound, at the head of Baffin Bay, and opened out headlands, glaciers, and frozen seas, hitherto unknown to us. This search and all the other trying endeavours were, we now know, made in wrong directions.

If, for example, Collinson had not made extraordinary efforts to force his way to the north-east through packs of ice, but had simply confined his voyage to the channel along the north coast of America, which he found so easy to follow, and by which he brought his ship safely back, and had known that the tract near King William's Land and the mouth of the Back River, the edges of which he actually touched, formed the goal we now desire to reach, the problem would have been for ever solved by him. If, then, there is no obstacle to a renewal of the western route, by Behring Strait and the north coast of America, what difficulty can there be in reaching the north-eastern edge of the limited area sacred to the memory of Franklin, by a ship proceeding to Batty Bay or Wager River, places which our vessels have already reached, and whence they have also returned unscathed? The instructions of Lady Franklin to Capt. Kennedy, the Commander of one of her private expeditions, were, that on reaching that tract where poor Bellot has left his name, a search was to be made south-westwards; and had the suggestion of that clear-sighted woman been followed, she would really have been the first to discover, by her own efforts, the remnants of her husband's expedition.

An ingenious essay, by Mr. Findlay, on the probable course pursued by Sir John Franklin's expedition, which was published in the last volume of our Journal, and in which the directions of the Arctic

currents are delineated, has sustained the idea which I once thought possible, but afterwards abandoned, that the two ships seen floating on an iceberg on the Newfoundland Banks may have been the *Erebus* and *Terror*. The same author has recently published an Appendix, in which, supporting his view by letters from parties well acquainted with the seaman who made the observation, he also gives a letter from Captain Ommaney, expressing his concurrence in the same view. With every respect for the opinions of such contemporaries, I cannot yet admit, that the vessels seen floating southwards may have been the *Erebus* and *Terror*; nor can I see why they may not have been other vessels. But even if it be granted that the question is to be thus disposed of as respects the ships, it is consolatory to find that both Captain Ommaney and Mr. Findlay strongly advocate a renewed search, to dispel our ignorance of the only region, whose exploration can solve the great Franklin mystery. Whatever may be thought of Mr. Findlay's view of Peel Sound being closed to the south, his suggestion, that the unexplored tract between the south end of Melville Sound and Victoria Strait is the area, which ought specially to be searched, is entitled to the serious consideration of all those who continue, like myself, to take a lively interest in the solution of this problem, and who are bent upon ascertaining, by positive survey, whether no traces of the ships or their records can be found, and also to satisfy us that no survivors are eking out their existence among the Esquimaux. On this last point I can never forget what I heard from the lips of Captain Hartstene himself. After our Sovereign had in December last visited the *Resolute*, that token of the good-will of the American people, the British Queen inquired, with the right feeling which is her characteristic, if he thought that any of her poor sailors might be still alive, and the gallant officer assured Her Majesty that, in his opinion, such might well be the case.

A strong tendency towards this belief, has indeed gained much ground since the publication of the admirable volumes of Dr. Kane. One passage from that work has been already cited in the brief tribute I have paid to the eminent man, who, when he was himself in dire want and had unexpectedly procured some fresh supplies of animals, thus exclaims: "How can my thoughts turn despairingly to poor Franklin and his crew? . . . Can they have survived? No man can answer with certainty, *but no man, without presumption, can answer in the negative.*" . . . "Of the one hundred and thirty-six picked men of Sir John Franklin in 1846, Northern

Orkney men, Greenland whalers, so many young and hardy constitutions, with so much intelligent experience to guide them, I cannot realize that some may not be yet alive—that some small squad or squads, aided or not aided by the Esquimaux, may not have found a hunting ground."

On this subject there has truly been much misapprehension in the mind of the public, owing to their ignorance of the geographical data on which hope is founded. The area within which some of the crews of Franklin were last seen, though much further to the south than the wild islands and headlands of the Arctic Archipelago, in which the *Resolute* and her companions were abandoned, and though easily and safely approached by sea, either from the west or east, is hopelessly cut off from all land furnishing the necessaries of life, by a broad, cold, and sterile region, occupied by a few wretched natives. The individuals of Franklin's expedition who might have survived, if located to the north among the Esquimaux who fatten upon seals and walruses, could by no possibility track their way southwards over these wilds, on which even the reindeer finds no sustenance. It is chiefly in the meridians on either side of the Back River that this sterility prevails; and here it was that Franklin and his former companions, Back and Richardson, suffered so intensely in 1824, that their existence was then nearly terminated.

With such a wilderness between them and any home, the exhausted crew of Franklin, contemplating nothing but starvation in that sterile icy region of central North America, would naturally, as Kane has suggested, seek a refuge among the Esquimaux, in some chosen spot where animals abound.

When we know from the declaration of a highly respectable seaman still living (one indeed of the crew of Parry),* that he was on the point of embracing the life of those savages, merely for the allurements of the chase and the wild attractions it offered, we can well imagine that those who were left of Franklin's noble crew should, according to the dictates of nature, endeavour in like manner to prolong their existence. Let it therefore be impressed on the public mind, *that although the area, on the southern edges of which some of Franklin's people were last seen, has been approached and can be easily again visited by ships, it has never yet been examined;† and also, that though it be to the south of many tracts formerly penetrated, yet is it so cut off by impe-*

* See 'Times,' December 20, 1856, Letter from Mr. John Peard to myself.

† Montreal Island, which has alone been visited, is incapable of affording sustenance even to Esquimaux.

*netrable wilds from the nearest parts of North America, in which food can be obtained, that by no exertion could any survivors of the Erebus and Terror be saved except by sending out a well-found ship or ships to the points nearest to such insulated Esquimaux quarters.**

As you are all acquainted with that appeal already mentioned, which my friends and myself thought it our duty to make to our countrymen on this exciting topic, I am sure you will rejoice with me, that the charge of the expedition, which Lady Franklin has resolved to send out, should have been undertaken by the eminently distinguished Arctic explorer, Captain M'Clintock. Commanding a thoroughly adapted screw yacht, the Fox, assisted by a well-qualified Polar associate, Lieut. W. R. Hobson, with Dr. D. Walker as the surgeon, and provided with a picked crew, this gallant officer will realize all that a firm resolve, a clear head, and skilful calculations can effect.

Let it also be recorded in our volumes, that amid the many generous Englishmen who have responded to the call, the name of Captain Allen Young, of the Merchant Service, stands pre-eminently forward; since this meritorious young seaman, who has already commanded large ships in various seas, has not only volunteered his

* Proposals were made by Lieutenant Bedford Pim and Dr. King to combine a land or river journey with maritime exploration: the former having, indeed, communicated previously a long memoir on the subject to the Geographical Society. Applauding those experienced men for their laudable endeavours to rouse public sympathy to continue the search, and reminding my associates that Dr. King accompanied Franklin in a former voyage, and that Lieut. Pim was highly commended by myself and others, not only for his Arctic researches, but also for his devotion to the cause in proposing to reach the supposed scene of disaster, by traversing Siberia, followed as it was by his march across the ice of Banks Sound to rescue M'Clure,—still, looking to the slender results of the recent land-expedition down the Back River, though carried out with all possible energy by Mr. Anderson, I cannot bring myself to believe that the renewal of any such enterprise can have a satisfactory issue. In fact, as we now know it to be impracticable that an exploring land and river party can convey more food in their canoes than will just enable them to make a hasty and wholly ineffectual search near the mouth of the river, all efforts to explore the adjacent northern tracts where those Esquimaux are chiefly living, among whom some of the missing navigators were heard of, must cease just at the moment and on the ground where they ought to be pursued. No exertions, in short, save those which can be made upon the ice by vigorous men proceeding from a well-supplied ship, can succeed in really ascertaining the fate of the crews of the Erebus and Terror. Other memoirs, suggestive of different plans for the most effective search after the relics of the Erebus and Terror, have been recently sent to the Society; thus evincing the great interest still taken by the public in the settlement of this question. These memoirs are: 'On the Discovery-ship Resolute and the Arctic Currents,' by M. Turnbull; 'On the Search for Sir J. Franklin,' by Chief-factor Anderson, communicated by Sir John Richardson; 'Plan of a Search for Franklin Expedition,' by Dr. R. McCormack; 'Plan of a future Search for the lost Franklin Expedition,' by James Parsons.

services, under the command of Mc'Clintock, but has actually subscribed 500*l.* towards the expense of the expedition in which he sails.* May God, therefore, crown their efforts with success! and may Mc'Clintock and his companions gather the laurels they so well merit, in their noble endeavour to dissipate the mystery which shrouds the fate of the *Erebus* and *Terror* and their crews!

If, however, this last effort which, in the absence of other aid save that of her friends, Lady Franklin is now making, should fail in rescuing from a dreary existence any one of our countrymen, and should not even a plank of the *Erebus* and *Terror* be discovered—still, for her devotion in carrying out this examination of the unvisited tracts wherein, we have every reason to believe, the ships were finally encompassed, every British seaman will bless the relict of the great explorer, who has thus striven to honour the memory of her husband and his brave companions.

My earnest hope is, that this expedition of Lady Franklin may afford clear proofs that her husband's party came down with a boat to the mouth of the Back River in the spring of 1850, as reported on Esquimaux evidence by Dr. Rae, and thus demonstrate that which I have contended for, in common with Sir Francis Beaufort, Captain Washington, and some Arctic authorities, that Franklin, who in his previous explorations had trended the American coast from the Back River westward to Barrow Point, was really the discoverer of the North-West passage!

In wishing then Godspeed to this private expedition, as I did to all the previous efforts of Lady Franklin, far be it from me to under-rate the zealous endeavours which successive Administrations have made during a series of years, whether to extend geographical knowledge and determine a north-west passage, or more recently to rescue Franklin and his crews—endeavours which will be recorded as among the great glories of Britain, in having brought forth in striking relief the characters of some of the ablest of our seamen, who, formed in that school of severe trial, have proved to be leading men in the late war. These British worthies have now been

* I am happy to announce that, whilst these pages were passing through the press, Petersen, the Esquimaux interpreter, well known to all the readers of the voyages of Penny and Kane, having returned from Greenland to Copenhagen, has, through the instrumentality of our distinguished foreign member Captain Irminger, Royal Danish Navy, and a telegraphic communication from myself, travelled through London and reached Aberdeen in time to join Captain Mc'Clintock. The *Fox* sailed from that port under Lady Franklin's eye on the 1st July, the whole party on board in the highest spirits — *July* 4, 1857.

appropriately rewarded by having had conferred on them their hard-earned Arctic medals; and I only regret that their noble feats should not, for the honour of the nation, have been terminated by one exhaustive public effort.

My admiration of these voyagers has indeed been recently enhanced, by the ardour and sincerity with which so many of them have offered their services, to continue the search after the relics of the Erebus and Terror. Such men are truly worthy of any distinction which their country can bestow, and all geographers must agree with me in regarding the Arctic medal which they wear, as an honour second to none which the Sovereign can confer.

CONCLUSION.

In bringing this discourse to a close I have now only to congratulate my associates on the steady rise which this Society has made in the estimation of the public, and on the vast accession to its members in the last few years. Commencing in a striking manner under the guidance of Admiral Smyth, and increasing during the successive Presidencies of myself, the Earl of Ellesmere, and Admiral Beechey, the augmentation has so continued, that we now nearly double the number of members at which we stood during many years.

Besides the vast augmentation of our Map Office, another distinctive feature in our recent progress has been the periodical publication of our Proceedings, which, whilst they record the doings and sayings at our evening meetings, sustain the spirit of the Society, and serve to keep the members, who have been unable to attend our meetings, well acquainted with the passing events.

Putting forth the substance of what is spoken as well as read, these periodical reports impart vitality to our Society, and will in future times be consulted with interest, as expressing the current opinions of British geographers and travellers "*de die in diem*;" a result for which we are mainly indebted to our able and zealous Secretary, Dr. Norton Shaw, who, in addition to the editorship of our Journal, has recently taken upon himself the whole of the editorial duties connected with this new publication.

Whilst the masses of our countrymen, it must be admitted, are better pleased with the news of the day, than with scientific discussions, many of the topics of which we treat are so popular, as well as important, that an enlightened portion of the press merits our best thanks for endeavouring to do justice to the promotion of those geographical researches in which we are embarked. It would be truly surprising if this were not so amongst Englishmen, whose

colonies extend to the Antipodes; and who have, therefore, more grounds than any other nation, for making themselves well acquainted with the surface of the earth, its productions, and inhabitants. I rejoice then to see that our numbers have so increased since my last Presidency, that adequate as we then thought the present apartments would prove for our wants, we already find that they will not by any means contain our members. Assisted, however, by Her Majesty's Government with an annual grant for keeping up a public Map Office, and enjoying a good balance at the banker's, there can be no difficulty in remedying this temporary inconvenience; and when the next Anniversary arrives, I trust that we shall be assembled in halls well adapted to accommodate us, including those ladies also who, following the example of their illustrious countrywoman, Mrs. Somerville,* take a deep interest in geographical science; for there is nothing more encouraging than to see the fair sex gathering information amongst us, to be by them communicated to the sons of England.

At the same time, whilst we maintain our popularity, we must render our annual Journal as far as practicable, not merely the exponent of interesting travels, but also the index of the progress of physical and comparative geography strictly so called, since we reckon amongst our associates, men who are competent to realize every wish to which the scientific geographer can aspire.

In thanking you, Gentlemen, for your friendly support, let me say, in conclusion, that when I undertook to stand in the breach occasioned by the death of my gallant friend Admiral Beechey, I did so under the persuasion that I could not execute more than one session of labour, considering that I had other scientific and official duties to perform. Feeling, however, that I may still be able to serve you for another year, I have, in compliance with your flattering request, consented to retain that which I consider to be as distinguished and useful a post as a man of science can occupy.

* In announcing that a new edition of Mrs. Somerville's remarkable work on Physical Geography is about to appear, I am happy to be able to state, that whilst we are taking measures to secure a permanent meeting-room, the Senate of the University of London and the Council of the Royal Society have acceded to the request of the Council of our Society, and have granted us the use of the large rooms at Burlington House for our ordinary meetings during the ensuing Session.—*Proc.* 12, 1857

MACEDONIAN ARMY
MOVEMENTS
at the
TAKING OF THERMUS

LEGEND

- M The Macedonian Army
- T Thermus
- V Vrachori
- A The Thermus
- B The Vrachori
- C The Thermus
- D The Vrachori
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- W The Thermus
- X The Vrachori
- Y The Thermus
- Z The Vrachori

PAPERS READ
BEFORE THE
ROYAL GEOGRAPHICAL SOCIETY.

I.—*Commentaries.* By Lieut.-General A. JOCHMUS. (*Written in 1830 and 1834.*)*—1. *On the Expedition of Philip of Macedon against Thermus and Sparta*; 2. *On the Military Operations of Brennus and the Gauls against Thermopylae and Ætolia*; 3. *On the Battle of Marathon, &c.*; 4. *On the Battle of Sellasia, and the Strategic Movements of the Generals of Antiquity between Tegea, Carya, and Sparta.* With Maps and Plans.

Communicated by SIR RODERICK I. MURCHISON.

Read, June 8, 1857.

1. *Expedition of Philip of Macedon against Thermus and Sparta.*

ON the ruins of Thermus, the ancient bulwark of Ætolia, has since been erected the small monastery of Vlochos, where, during the Greek revolution, the captains of Ætolia so often, and always successfully, defended themselves against the Turkish invaders. Some inconsiderable stone walls (*tambouri*) or redoubts have sufficed, in a position by nature almost impregnable, to impose awe on enemies even of great number. Such is the strength of the ancient acropolis of Thermus, that it can be attacked only on the south-east—that is, on the side which overlooks the lake of Vrachori, anciently that of Trichonium. The citadel crowns the summit of a conical mountain, inaccessible on other sides.

There are two roads which lead from Vrachori, that is, from the great plain round the modern lakes of Angelo Castro and Vrachori direct to Thermus; one nearly in a direct line, the other following for some distance the bed of the Thermisus. These two roads unite at the point where the last ascent to the

* The author was at that time a Captain on the Staff of General Sir Richard Church, in Greece, and subsequently in the Bavaro-Greek War Office. The Commentaries were made on the sites of ancient Thermus and Sparta.

citadel begins: but they are so steep, difficult, and narrow, that it is impossible to attack the acropolis on these several points, where a handful of men would frustrate all the efforts of the assailants, who could only approach one by one.

From the side that faces the lake of Vrachori on the other hand, the access is easier, and there a sufficiently considerable front of attack might be developed. Thermus is reached in this direction by a road which starts from the neighbourhood of Couvélos, near the borders of the lake. M. de Pouqueville, the last author of any note that has written on this part of Greece, has called this spot *Cernelos* (and places Trachinium close to it); but this must be an error in the manuscript, for in the country it is called Couvélos.

We shall refer what has been said respecting the particular position of the ancient citadel of Thermus, and the manner in which it can be attacked, to the expedition against this capital by that Philip, King of Macedon, who was contemporary with Aratus; and in following that able general through his subsequent campaign to the battles that took place near Sparta, we shall present certain reflections and illustrations on one of those great and isolated military conceptions that history offers from age to age as extraordinary occurrences.

Polybius, in the fifth book of his general history, gives the summary of these memorable events; and the observations we are about to make on his recital, which are the result of studies made on the ground itself, will have the two-fold advantage of showing the operations of the Macedonian general in their true point of view, and of removing the errors that have been introduced into the accounts or commentaries of certain modern authors, and more particularly of M. de Pouqueville. (*Histoire de la Grèce*, chap. lxxxviii.) According to Polybius—

"The King, having left his baggage behind him with a proper guard, began his march from Lindera in the evening; and when he had gained the distance of about 60 stadia, he ordered the troops to take their supper, and, having allowed a short time for repose, he again set forwards, and, continuing his journey all night, arrived before break of day upon the river Achelous, between Stratus and Conope. His intention was to fall suddenly upon the place called Thermus, before the inhabitants could be able to receive the news of their approach. Leontis clearly saw that this design must evidently be attended with success. . . . He pressed the King to encamp upon the river Achelous, that the troops, who had marched all night, might enjoy some rest. . . . But Aratus, on the other hand, well knowing how soon in all such enterprises the favourable moment might be irrecoverably lost, and perceiving also that the purpose of Leontis was plainly to obstruct the progress of the war, urged the King to proceed without delay, and not suffer the occasion to escape. Philip, who was already much displeased with the whole conduct of Leontis, approved of the advice, and, having passed the river, continued his route in haste towards Thermus, burning and destroying the country as he marched. Leaving on the left hand, Stratus, Thestia, and

Agrinium; and on his right, Conopé, Lysimachia, Trichonium, and Phœtum, he arrived at a town called Métapa, which was situated in the entrance of those parts that led along the lake Trichonis, and was distant from Thermus about 60 stadia. The Ætoliæ fled from the place upon his approach, and the King posted in it a body of 500 men, as well to cover his entrance as to secure also his retreat back again through the passes. For the country that lay along the borders of the lake was rough and mountainous, and covered all with woods, so that the passage through it was extremely close and difficult. Philip entered the defiles, placing in the van the mercenaries, &c. . . . The left was covered by the lake to the length of thirty stadia. Having gained the end of the defiles, they came to a village that was called Pamphila. The King, when he had posted a body of troops in this place also, continued his march towards to Thermus, through a road that was not only steep and rough, but surrounded on all sides by lofty precipices, so that in many parts it was not to be passed without great danger. The whole height also of the ascent was almost 30 stadia. But the Macedonians pursued their way with so great diligence and vigour that they soon gained the summit and arrived at Thermus while it was yet full day. The King fixed his camp near the city, and from thence sent away the troops to ravage all the villages and neighbouring places. They pillaged the houses of the city likewise, which were not only filled with corn and every kind of necessaries, but with great quantities of rich and costly furniture. . . . For such was the strength and situation of the city that it was considered as the citadel of all Ætolia; and indeed, before this time, no enemy had ever ventured to approach it.”—(*Hanilton's Polybius*, lib. v. chap. 1.)

“The King, taking with him everything that could be carried or removed, began his march back again from Thermus by the same way by which he had arrived. . . . He resolved to pass through the defiles with the quickest haste, not doubting that the Ætoliæ would take advantage of the difficulty of the way, and fall upon him in his retreat. And this, indeed, soon happened.” (Polybius goes on to describe the unsuccessful attack of the troops under Alexander of Trichonium upon the rear of Philip's army, and then continues.) “The rear, setting fire to Pamphila as they marched, passed the defiles with safety, and joined the rest of the army, who were encamped near Métapa, expecting their arrival. The King razed this city to the ground, and the next day advanced to a town called Acra. On the following day he again encamped, and, wasting all the country as he passed, arrived near Conopé and rested there during one whole day. He then continued his march along the river Achelous towards Stratus; and having passed the river he for some time stopped his march.” (Then follows a description of an attack on the rear by the garrison of Stratus.) “After this attempt the Ætoliæ remained quiet within the city, while the others pursued their march with safety, and joined the rest of the army and the vessels.”—(lib. v. chap. 2.)

We then trace the Macedonian King, having come unexpectedly from Leucas, after he had left his baggage at Limnaea, advancing during a night march to the banks of the Achelôus, between Conopé and Stratos, where he arrived before break of day, with the intention of pushing on thence by a single march to Thermus, which he wished to surprise. Without giving any rest to his troops, he continued his expedition with great rapidity, passed the Achelôus, leaving on his left hand Stratos, Thestia, and Agrinium, and on his right Conopé, Lysimachia, Triconium, and Phœtum, and arrived at Métapa, *situated at the entrance* of the defiles which extend along the lake of Trichonium, and at a distance of 60 stadia from Thermus.

Here the narrative of Polybius becomes somewhat obscure, for it might be inferred from the text, that after having made his preliminary arrangements for the attack, the king had continued his march along the lake. But if we consider, on inspecting the map, that in that case the lake must have been *on his right*, and that the historian on the contrary expressly states, a few lines afterwards, that "*the left of the Macedonian army was covered by the lake,*" it is easily understood how Philip, after reaching Métapa, made a change of front—a movement in fact necessary, if from this place, where he left a part of his army, he wished to march on Thermus, as will be seen on examining the annexed plan; for his army, halting at Métapa, had already passed beyond Thermus, since the first of these towns must have been situated at Couvélos, where are still to be seen the ruins of an ancient town and fortress.

Not only does Métapa, thus determined, and situated on an isolated hill between the lake and the mountains, cover the entry of the defiles, but its military position is so excellent and so strong, that the King of Macedon and the skilful Aratus would at a glance have necessarily chosen it as the immediate pivot of the operations against Thermus.

In measuring with the watch the 60 stadia from Couvélos (or Métapa) to the citadel of the capital of Ætolia, there will be found about half-way, the bed of the torrent called Lycochori, "and the ascent thence to Thermus is 30 stadia." The ancient village of Pamphla, which Philip wisely caused to be occupied, must therefore have been near the banks of this torrent. If, in addition, we calculate the entire distance from Stratos to Thermus, which the king reached with his army when it was "still open daylight," we shall be persuaded that he could not have passed *beyond Couvélos*; for

	Hrs.	Min.
From Stratos to the modern village of Zapandi it is,	1	20
including the passage of the ford at the Achelous, a		
distance of		
From Zapandi to Vrachori	0	50
From Vrachori to Couvélos	3	0
From Couvélos to Thermus	2	30
	<hr/>	
	7	40

measured at a pace of 3 English miles per hour.

From Stratos to Couvélos the road is through a wide and fine plain; but the $2\frac{1}{2}$ hours from the latter place to Thermus are very fatiguing, there being considerable ascents and descents.

An army, however unembarrassed by baggage, cannot effect this journey in less than $9\frac{1}{2}$ or 10 hours; and if we reckon the additional time it must have taken Philip to execute his preparatory manœuvres at Metapa, for the purpose of occupying that

town and Pamphlia, it may be conceived with what great diligence he must have ascended to Thermus in order to reach it when it was still full day, for it will be seen that he could not have made a "longer" march.

The nature of the places is still the same. In the neighbourhood of Thermus, the hand of man has made no change in these savage retreats that have for so many ages been abandoned to the wild beasts which at present are its sole inhabitants.

We may still, at a glance, determine "the obscure and covered spots" where the 3000 Ætolians hid themselves, who, with Alexander of Trichonium, entered Thermus (as soon as Philip had evacuated it) for the purpose of attacking the Macedonian rear-guard. The reader will recollect what has been said of the road which on the side of the plain of Vrachori conducts into the citadel. All this part of the mountains is covered with impenetrable woods, and Alexander's 3000 men could in a great part have concealed themselves at the distance of an arrow-shot from the place, without their presence being at all suspected.

These peculiarities have led me to believe, that without going far wrong, we may fix Trichonium in the immediate neighbourhood, or on the very site, of Vrachori. This town would in antiquity have given its name to the great lake near it, just as Vrachori does in modern times.* The most direct road from Stratos;

* ἡ ἴστω καὶ Σπάρτης καὶ Τριχονίου, ὁρίσθη ἔχον γῆν. Strabo, Geog. lib. x., chap. in. Ætol. et Acarn. This description perfectly applies to a town at or in the immediate vicinity of Vrachori; for the lands there are the most fertile in Western Greece. In the Tanchitz edition 1819 of Strabo the reading is Τραχονία instead of Τριχονία, as correctly given in the edition of Korai.

The author of the 'Voyage de la Grèce' (chap. lxxxii) has entertained a singular idea respecting Stratos, in an attempt to explain Casaubon and Paulmier de Grentmènil. "As respects distance," says he, "as the apex of a triangle formed by Alyzia, Anaetorium, and Stratos, a position which has strangely puzzled Casaubon and Paulmier de Grentmènil in explaining the *κατὰ μέσον ὁδόν* (half-way) of Strabo, I think that I can resolve this difficulty. If the reader will bear in mind what I have advanced, he will see that Alyzia, or Candili, is almost under the meridian of Anaetorium; but Mount Berganti, or Boubastis, forming a line between the north and the south of Acarnania, has obliged travellers in all ages to make a circuit by Stratos; that is, to proceed nearly nine leagues to the east, in order to go from that place by Limnaea to Anaetorium (near Voutza). Thus may be explained and made consistent the words of the ancient authors, who are always found correct, when tested by the ground as it was when they saw it."

This opinion is altogether erroneous; for there are three roads that leave Candili—one to the left and two to the right—to cross Mount Boubastis, which does not at all divide Acarnania in the sense understood by the author. These roads open—two of them at Zaaverda; the third, called that of Livadia, in the wood of Nilo-Pigado. The road that runs by the sea is at Cape Camnasea, it is true, impracticable for horses, but by making a circuit of half an hour, it is regained on the other side of that promontory, and the journey may be continued thence without difficulty to Zaaverda. From Candili to Voutza or Anaetorium is an easy day's journey, whereas it would take nearly four days to go from Candili, by Stratos and Limnaea, to Anaetorium. As the pretended barrier of Mount Boubastis, then, has no existence, either Strabo must be considered as expressing himself vaguely, or else Alyzia is not near Candili. Even if the latter be probable,

Couvélos passes at the foot of the mountain on which Paléo-pyrgo stands, and Philip in following it would have left Trichonium at eight or ten minutes distance *on his right* in proceeding towards Métapa.

This town, according to what has been stated, appears to have existed on the site of the modern Couvélos, that is, to the north of the lake of Vrachori or Trichonium; whereas M. de Pouqueville, and probably led by him, the Chevalier de Lapie, in his map of Greece, places it to the south-east of this lake, at the village of Metarga, fixing Pamphlia close by. The German archaeological maps of Kruse have apparently been similarly falsified, after the erroneous data given by the French traveller.

Would Philip, then, on leaving Stratos to go to Thermus, have proceeded first to Couvélos (the true Métapa), thence to Metarga, on the south-east side of the lake, thus going half round it, and then retracing his steps to the neighbourhood of Couvélos, to ascend thence to Thermus? In order to execute such a march as this in a single day, with troops already wearied by a night-march of eight or nine hours from Limnæa to Stratos, and to reach Thermus *while it was yet day*, the King of Macedon must, in fact, like Joshua the Hebrew general, have caused the sun to stop in his course! To make half the circuit of the considerable lake of Vrachori, indeed, by the successive ascents and descents of its jagged banks, would require seven hours' ordinary marching through narrow and difficult defiles. It would have been requisite, moreover, on this strange hypothesis, to return by the same road and lose the same time; and all this to give success to the prince's plan of *surprising* Thermus!

In order, however, to furnish decided proof that Métapa and Pamphlia were situated on the south-east of the lake of Vrachori, M. de Pouqueville (*Hist. de la Grèce*, ch. lxxxiv.) makes Philip march from Thermus, and "*direct his course towards Ætolia Epictetus*," leaving Lysimachia, Trichonium, and Phætium *on his right*. He proceeded then, according to the French author, by Métapa (Metarga?), a town which he destroyed after pillaging Thermus, into the district of Vénético, in which case he must really have left on his right the towns above mentioned!

Now Polybius (*Hist.*, lib. v. ch. 2) announces in precise terms, that "the King, after having, with a body of Illyrians placed in ambuscade on the road from Thermus to Métapa, routed the

we must still admit that the Greek author, in describing Stratos as *between* Alyzia and Amethionum, in order to designate the mountain now called Boubistas, which is in fact at that distance, and might have borne that name amongst the great number of others which it seems to have had in succession. In this case there has been some fault of the copyists of the geographer in transcribing ἡ Στράτος instead of ἡ Στράτος.

3000 troops of Alexander of Trichonium who harassed his rear-guard, and after having burnt the village of Pamphlia, safely passed the defiles, and rejoined the rest of his army that was encamped at Métapa, a town which he razed to its foundations. On the day following, Philip advanced to Acræ, and laying waste the country, he encamped the day after at Conopé, where he rested a day, returning subsequently to Stratos and to Limnæa, where his fleet was stationed.

He did not then go into Ætolia Epictétus (the modern Vénético). In fact, such a march would have been strangely in opposition to the strategic principles adopted on this important occasion by the Macedonian general, who inflicted a fatal defeat on his enemies by attacking them in the heart of their country and wholly destroying their capital, at a time when the Ætolians believed him to be at Leucas, the modern Santa Maura.

The King, then, in returning from Thermus, by Métapa, and the road by which he had come, must necessarily have had Phætium, Trichonium, and Lysimachia on his *left*, supposing that in going they were on his *right*. Very possibly, however, in his progress towards Conopé (as we have indicated in the map), he might have left northwards the town of Trichonium (supposing it to have occupied the site of the modern Vrachori), for Polybius says that the king afterwards *ascended* the course of the Achelôus towards Stratos. In any case, however, Lysimachia (near the site of Arsinoë, beyond the lake of Angelo-Castro) would be on his left.

As regards the locality in which Philip halted his army after the march from Acræ towards Conopé (and which Polybius alleges to have been *near that place*), the troops evidently encamped on the left bank of the Achelôus, in the neighbourhood of Calivia, in order to refresh themselves in the cool vicinity of that hamlet; for we find the Prince subsequently *continuing his march along the river-bank* towards Stratos, which he passed in order to offer battle to the Ætolian garrison, which the latter declined.

To the north-east of Stratos, on the left bank of the Achelôus, are the ruins of a considerable ancient town, which I conceive to be those of Thestia. At Paléo-pyrgo, likewise, are some slight remains of an old fortification, apparently Hellenic (perhaps the ancient Agrinium).

The military proceedings of the King in all this expedition are marked throughout with foresight, tact, and vigour of execution. Alike is the consummate general seen in the defiles of Thermus, under the walls of Stratos, and in the retrograde march on Limnæa: and we shall repeat what M. de Folard has written on this head, though in other respects we are far from coinciding with his opinions upon the expedition against Thermus. "The retreats of armies, it may be said, call forth all the very highest efforts of

military skill, profound tactics, experience in marching, knowledge of the mode of crossing rivers, and, in a word, all the characteristics which constitute a great captain, and a warrior of the first order."

This observation may be applied also to the fine strategic movements which the King executed in the course of the campaign against Sparta, undertaken just after his memorable successes in Ætolia. The same principles prevail in both expeditions, viz., boldness of conception, rapidity in marching and manœuvring, energy and brilliancy of execution. Polybius states—

"Philip sailed away from Leucas, and, having wasted the coast of the Hynanthæans as he passed, arrived at Corinth with all the fleet, and cast anchor in the harbour of Lechaum. He then disembarked his army; and when he had first sent letters to the confederate cities of the Peloponnesus to appoint the day in which their forces should be ready in arms and join him at Tegea, he immediately began his march towards that city with the Macedonians, and, taking his route by way of Argos, arrived there on the second day: and, being joined by such of the Achaean forces as were then assembled in the city, he continued his march along the mountains, with design to fall upon the Lacedæmonian territory before the people could receive any notice of his approach. Passing, therefore, through those parts of the country that were chiefly destitute of all inhabitants, he appeared, after four days' march, upon the hills that stand opposite to Sparta, and from thence leaving the Menelaion on his right, he advanced forwards to Amyclæ. . . . For marching, as we have already mentioned, from the middle of Ætolia, and having passed, in one day's time, the Ambracian Gulf, he arrived at Leucas, and when he had staid two days, on the third sailed early in the morning: and, wasting the coast of Ætolia as he passed, cast anchor at Lechaum; and from thence marching forward without delay, he gained upon the seventh day the neighbourhood of Menelion and the hills that overlooked the city of Sparta. So astonishing was this celerity, that those who themselves beheld it could scarcely give credit to their eyes. . . .

"The King, on the first day, fixed his camp near Amyclæ, which is distant from Lacedæmon about 20 stadia. . . . On the next day he decamped, and, destroying the country as he passed, arrived at the place that was called the Camp of Pyrrhus. On the following days he wasted all the neighbouring places, and came and encamped near Cunnium, and from thence continuing his march to Asini, attempted to take the city. But after some fruitless efforts he again decamped, and ravaged all the country on the side towards the secret Cretæ as far as Tenarium. From thence, taking his route back again, and having on his right hand the port called Gythium, which is distant from Lacedæmon about 30 stadia, he encamped upon the frontiers of the Helian district."

(The next section by Polybius is occupied with the defeat at Glymptium, or Glympe, of the Messenian allies of Philip by the Lacedæmonians under Lycurgus.)

"The King now decamped from the Helian district, and wasting the country on every side, arrived again, after four days' march, in the neighbourhood of Amyclæ, where he left his army, about the middle of the day. Lycurgus having, in concert with his friends and officers, regulated all the plan of the intended attack, marched out of the city (of Sparta) with two thousand men, and took possession of the posts round the Menelaion. At the same time he ordered those that were left in the city carefully to observe the time, and, as soon as

they should perceive his signal, to lead out their troops from many parts at once, and range them in order of battle, with their front turned towards the Eurotas, and in the place in which that river flowed nearest to the city. Such was the disposition of Lysurgus and the Lacedæmonians.

"Sparta, if we consider it in its general figure and position, is a city in a circular form, standing in a plain. But the ground, in certain parts that are within the circuit of it, is rough and unequal, and rises high above the rest. Close before the city, on the side towards the east, flows the Eurotas—a river so large and deep that during the greatest part of the year it is not to be forded. Beyond this river, on the south-east of the city, are those hills upon which stand the Menelaion. They are rough and difficult of ascent, and command entirely all the ground between the river and the city. For the river takes its course along the very border of the hills, and the whole space from thence to Sparta does not exceed a stadium and a half in breadth.

"Such was the defile through which Philip, as he returned, must be forced to pass, having on his left hand the city, with the Lacedæmonians ranged in battle, and ready to engage; and on his right, the river and Lysurgus with the troops that were posted on the hills. But, besides these difficulties, the Lacedæmonians, in order more effectually to obstruct his passage, had stopped the course of the river at some distance above the ground which we have mentioned, and forced the waters to flow over all the space that lay between the city and the hills, so that neither the cavalry nor infantry could march that way with safety. The Macedonians, therefore, had no means left for their retreat, but to lead their army close along the very foot of the hills. But as they must then have marched with a very narrow and contracted front, it would scarcely have been possible to resist the efforts of the enemy. When Philip had considered all these difficulties and had held a consultation also with his generals, he judged it necessary that Lysurgus should be first dislodged from his posts upon the hills. Taking with him, therefore, the mercenaries, the peltastæ, and the Illyrians, he passed the river and advanced towards the enemy. When Lysurgus saw what the King designed, he exhorted his troops to perform their duty, and prepared them for the combat. At the same time he gave the signal also to those that were in the city, who immediately ranged them in order of battle before the walls with the cavalry upon their right. Philip, as he approached nearer to Lysurgus, first sent the mercenaries against him to begin the action. The Lacedæmonians, therefore, who were superior in the advantage of their arms and from the situation also of the ground upon which they stood, for some time maintained the fight with the fairest prospect of success.

"But when Philip ordered the peltastæ to advance and support the troops that were first engaged, while himself, with the Illyrians, prepared to fall upon the enemy in the flank, the mercenaries, encouraged by this assistance, pressed the charge with greater vigour than before, while the Lacedæmonians, being struck with terror at the approach of the heavy-armed forces, turned their backs and fled. About a hundred of them were killed in the place, and more than that number taken prisoners. The rest escaped safe into the city. Lysurgus himself, with a small number of attendants, retreated through some private roads and entered the city also in the night. Philip, having posted the Illyrians upon the hills from whence he had dislodged the enemy, returned again to join the rest of the army with the peltastæ and the light-armed troops.

"During this time the phalanx had begun their march from Amyclæ under the conduct of Aratus, and were now arrived near the city. The King, therefore, passed the river with the light-armed forces, the peltastæ, and a body of cavalry, in order to sustain the attack of the Lacedæmonians, till the heavy-armed troops, who continued their march along the sides of the hills,

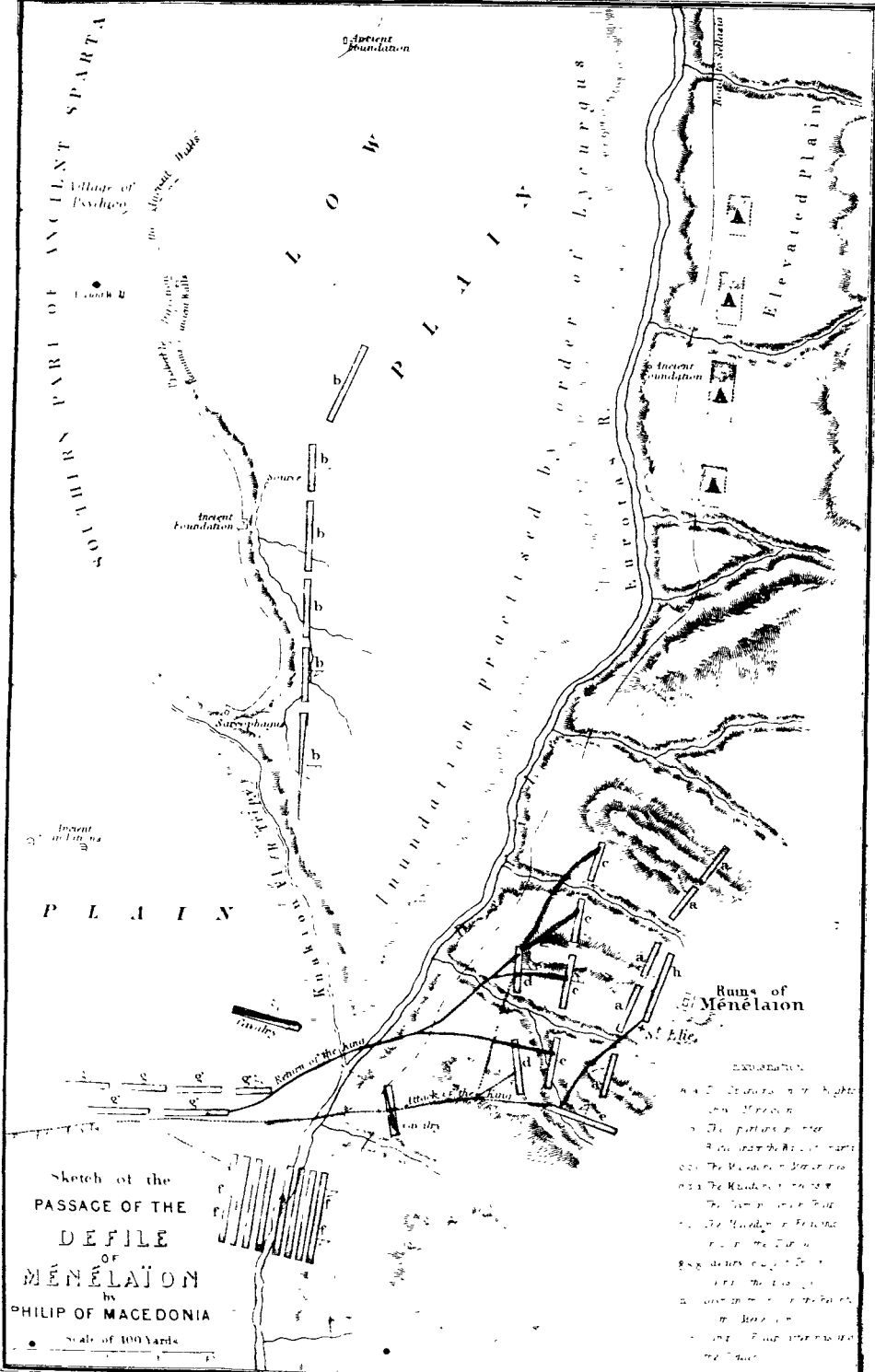
should have passed through the defile with safety. The Lacedæmonians, advancing from the city, charged first the cavalry of the King; but as the action soon became more general, and was sustained by the peltastæ with the greatest bravery, the victory was again wholly turned to the side of Philip, who drove back the Lacedæmonian cavalry and pursued them even to the gates. He then passed again the river, and closing the rear of all the phalanxes, continued his march forward without any loss.

"He had just now gained the end of the defile when the night suddenly came on, and forced him to encamp without advancing any farther. It happened that the place which the guides were thus compelled, as it were by accident, to mark out for the encampment, was that very ground which an enemy would take by choice, if their intention was to pass beyond the river of Sparta, and to make incursions upon the Lacedæmonian territory. For it was situated at the extremity of this defile of which we have been speaking in the road which leads to Lacedæmon, not only from Tegea, but from all the inland parts of Peloponnesus, and stood close upon the border of the river at the distance of two stadia only from the city. The side that looked towards the river and the city was covered by steep and lofty precipices, which were almost inaccessible; and above these rocks was a level plain, which abounded both with earth and water, and was also disposed so that an army might at all times enter it or retire again with safety. In a word, whoever has once gained possession of this plain, with the precipices likewise that are round it, not only may remain secure against all attacks from the side of Sparta, but is the master also of everything that enters or returns through the defile.

"Philip having here fixed his camp in full security, on the following day sent his baggage away before, and then drew out all his forces in order of battle upon the plain in sight of the city. And when he had stood for some time in that disposition, he then turned aside and directed his route towards Tegea. Arriving at the place in which the battle had been fought between Antigonus and Cleomenes (Sellasia), he there encamped, and on the following day, when he had first viewed all the neighbouring posts and offered sacrifice to the gods upon the mountains Eva and Olympus, he strengthened the rear of his army, and continued his march to Tegea, and having there sold all his booty, he passed from thence through Argos and arrived at Corinth."—(*Hampton's Polybius*, lib. v. chap. 2.)

The King reached Sparta from Leucas in seven days—four of which were spent in marching from Lechæum near Corinth to the heights of the Menelaion; and "such was the astonishing celerity of his movements, that those even who were eye-witnesses of them could scarcely believe the evidence of their senses." The sea-voyage from Leucas (Sta. Maura) to Corinth was no doubt very prosperous, especially if we consider that in these seas the winds often blow violently, and for a long time in one and the same direction, and that further, especially in summer, the time of the expedition referred to, dead calms are of equal frequency. Fortune, however, was favourable to the King of Macedon; and in his turn he deserved it by his brilliant movement from Corinth, by Argos and Tegea, to the very gates of Sparta.

Philip having, according to the Greek historian, left the Menelaion to the right, must have passed in his march towards Amyclæ, over the high plateau which flanks on the east this part of the



Eurotas, and the range of moderate hills, on one of which stand the ruins of the temple called Menelaïon ; and in consequence of which the whole range has been wrongly marked in maps "*Mts. Menelaïon.*" He passed the river opposite or near to the height of Amyclæ ; for the Eurotas in summer is almost everywhere fordable ; whereas in winter, and during the spring and autumnal rains, it is often very rapid, and so much swollen that there are only one or two fords in the neighbourhood of Sparta, and even these are sometimes wholly impracticable.

The Macedonian general, after ravaging the whole valley of the Eurotas, as far as the environs of Boea and Gythium, returned to the neighbourhood of Amyclæ, where he encamped with all his army. There he became acquainted with the positions taken up by Lycurgus and the Spartans, who had occupied the heights of the Menelaïon, and the right bank of the Eurotas, on which latter they had also effected an inundation. Polybius, in giving a detailed description of the localities, and the posts occupied by the Lacedæmonians, maintains that the King found the circumstances so critical, and the dispositions made by the enemy so formidable, that, after holding a council of war, he resolved to force the defiles of the Menelaïon.

The Macedonians, in fact, ever since their entrance into the Lacedæmonian territory, had ravaged and laid waste all the hostile provinces ; but there had not been any general engagement. On the contrary, the Lacedæmonians, when surprised, being obliged to retreat behind their walls, had not had it in their power to contend in the open field against the superior force of Philip ; though his allies, the Messenians, had just been defeated at Glymptium by this same Lycurgus, who attempted to dispute the passage of the King's army. The words of Polybius (lib. v. ch. 5) are as follow :—"Lycurgus, proud of this little success, returned to Lacedæmon, to be in readiness to defend himself against Philip. He and his friends were of opinion, that the King should not be allowed to leave the country without a battle."

The glory of the Macedonian arms had been tarnished ; and though it was only their allies who had suffered a slight check, it became them to re-establish their superiority, and not pass near Sparta without evincing a determination to fight. The King, accordingly, with that admirable tact, which he exhibited throughout this war, considered that it would give additional *éclat* to combat the enemy in a position that the latter deemed very strong, though in fact it was only so in appearance. He attacked and completely defeated them, offered them battle afresh the day after his victory, and left the country with glory, and as puissant as he had entered it, leaving Sparta humbled, and the prestige of Macedonian superiority established beyond dispute.

We have traced on the accompanying Plan of the Defiles of the Menelaion the movements of the battle there, such as they appear to have been on a close inspection of the ground. It is remarkable that Polybius makes no mention of the river Tripy—generally believed to be the ancient Knakion, which runs along the east and south-east sides of the ruins of Sparta, in its course to join the Eurotas, 1,000 metres ($5\frac{1}{2}$ furlongs) s.s.e. of the last traces of the ancient city. As he omits all mention of this stream, it is clear that the passage of the Eurotas was effected below its confluence, but it is surprising that in the affair on the right bank between Philip's light troops and the Spartans, the historian should have maintained the same silence, although the contest must have taken place on its banks, which, it is true, are much flattened towards the junction of the two rivers, the smaller of which has but little water in summer. As it offered, therefore, no great obstacle, Polybius probably deemed himself no obliged to mention it explicitly by name.

The following explanations of the movements described by Polybius correspond, letter for letter, with those marked in the Plan:—

- a a a.* The Spartans under Lysurgus on the heights of the Menelaion.
- b b b.* The Lacedæmonian troops in order of battle under the walls of Sparta, fronting the Eurotas, and the cavalry on the right.
- c c c.* The mercenaries of Philip drawn up to attack the heights, and later in the day supported by—
- d d.* The Macedonian peltastæ.
- e.* The King, at the head of the Illyrians, taking in flank the troops of Lysurgus.
- f f.* The Macedonian phalanx crossing the Eurotas.
- g g g.* The light troops and a body of cavalry, after recrossing the Eurotas with the King, drawn up in order of battle against the Lacedæmonian troops on the right bank, in order to protect the heavy armed troops while crossing.
- h.* The Illyrian troops occupying the heights of the Menelaion after the defeat of Lysurgus.
- A A.* The camp of Philip on leaving the defiles on the elevated plain in front of Sparta, where he offered battle to the Lacedæmonians.

(The remainder of this paper is occupied with notes on the Chevalier Folard's "Observations on the Expedition of Philip into Laconia.")

2. On the Military Operations of Brennus and the Gauls against Thermopylæ and Ætolia.

To the preceding commentaries and reflections on two memorable expeditions, the success of which depended no less on the wisdom of their conception than on the promptitude of their execution, we shall append a few pages relative to an undertaking equally remarkable—the expedition of Brennus and the Gauls against the

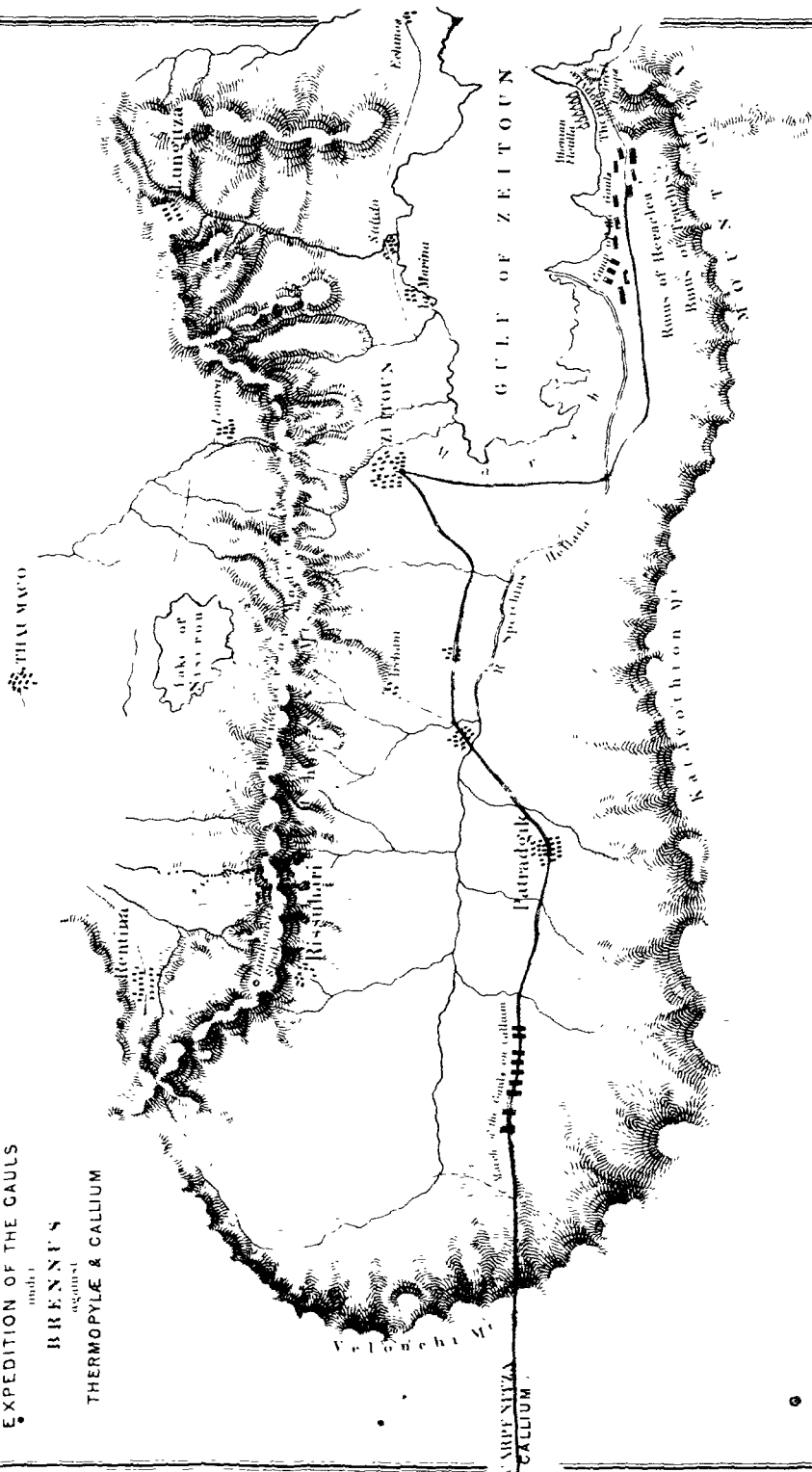
Sketch of the
EXPEDITION OF THE GAULS

made by

BRENNUS

against

THERMOPYLE & CALLUM



Thermopylæ and *Ætolia*. The invasion of the latter by the road of Callium (the modern Carpenitza) determined the fate of the Greeks who fought in the defiles of Mount Ceta. In doing this, we have the twofold object of connecting a narrative of that event, which really was decided in *Ætolia*, with the account of the taking of its ancient capital, considered to be the key of the country, and, at the same time, of pointing out how the Gauls, under the conduct of an able general, turned the defiles which they were unable to force in front, as had happened to the Persians before them. As has been remarked, the river Sperchius has at all periods proved a fatal obstacle to the invaders of Greece. On its banks, by the side of the Persians and the Gauls, lie the bones of the Bulgarians, led by their king Samuel, as well as those of the French cavaliers who fought under the oriflamme of Count Boniface of Champagne.

The Sperchius and the Pass of *Thermopylæ* may, however, be turned at a distance, either by an army coming from Thessaly and directing its march towards the Cephissus by way of Callium, or by a force which arrives from Albania, and invades Western Greece by the *Macrinoros*, in order afterwards to move by its left.

The *Thermopylæ*, in the present day, are no longer so easy to defend as formerly, yet, at all events, they form a fine position; but Callium (or Carpenitza), which was always regarded as a first-rate strategical point in the Turkish and Venetian wars, and the *Macrinoros*, are positions, which, along with the *Thermopylæ*, complete the system of territorial defence of modern Greece (that is, of the provinces south of the Gulf of Arta and Zeitoun), and thus have become of at least equal importance.

Brennus was the first general of antiquity who perceived the military importance of Callium, as will be seen by his operations during his invasion of Greece which was followed by the capture of Delphi. On the approach of the numerous cohorts of the Gauls—which Pausanias * has estimated at 152,000 infantry and 20,400 cavalry, each of the latter served by two attendants on foot—the Greek army, which may be reckoned at nearly 30,000 men and a flotilla of Athenian galleys,† were established at the *Thermopylæ*. The Grecian generals thence detached 1000 foot-soldiers, and the best of their cavalry, towards the right bank of the Sperchius to break down the bridges: but Brennus, having already caused that river to be crossed by 10,000 Gauls, partly by ford, in part by swimming, and the rest in small barks, the Greek corps ordered to prevent their passage fell back on the main body of the army at the *Thermopylæ*.

Without wasting his time in taking *Heraclæa*, Brennus, who had

* Pausan, lib. x., cap. xix.

† Ib., lib. x., cap. xx.

conducted his troops to the right bank of the Sperchius, led them to the Pass of the Thermopylæ, which he could not force, and where he suffered a severe check, owing equally to the brave resistance of the Grecian land-forces and to the powerful diversion made by the Athenian galleys.* Repulsed also, seven days afterwards,† in attempting the passage of Mount Œta, the Gallic generals were beginning to lose courage, when Brennus, forming one of the greatest conceptions in strategy, resolved to turn at a distance the whole formidable mountain-barrier, which he could not force in front. Pausanias says—

“Having chosen forty thousand foot and eight hundred horse out of his whole army, he gave the command of these forces to Orestorus and Conlutus, and ordered them, first of all, to pass into Thessaly over the bridges of the Sperchius, and afterwards invade Ætolia. (Callium was then taken by the Gauls). . . . But the Ætoliæ, having learnt from certain messengers the calamities which had befallen their country, immediately, with all possible celerity, led back their forces from Thermopylæ to Ætolia; being enraged at the sufferings of the Callienses, and desiring to save those cities which had not yet experienced the fury of the barbarous enemy. . . . But the Barbarians, as soon as they had plundered the houses and temples, and had set the city Callium on fire, returned the same way as they came, to their own people; and the Patrenses alone, of all the Achæans that assisted the Ætoliæ, opposed the Barbarians with their armed forces, in the use of which they were very skilful. However, they were greatly oppressed, both by the multitude of the Gauls, and despair of success. But then the Ætoliæ, both men and women, placing themselves in every part of the road, pierced the Gauls with their darts. . . . For out of that great multitude of Gauls, which amounted to forty thousand and eight hundred men, scarcely the half escaped to the camps at Thermopylæ.

“But the transactions of the Greeks at Thermopylæ, at the same time, were as follow. There are two paths through the mountain Œta: one of these, which is above Trachis,‡ is very craggy and steep; but the other, which is through Æniana, may be easily passed by foot soldiers: it was through this that the Mede Hydarnes once led his forces and came behind the Greeks that were commanded by Leonidas. They understood that the Heracleotæ and Æniana were leading Brennus through this path, not from any malevolence to the Greeks, but in consequence of being convinced that it would be a great undertaking if they could induce the Barbarians to leave their country before it was ruined. . . . Brennus, leaving Acichorus in his camp, and informing him that it would be proper for him to attack the enemy when he was certain that he (Brennus) was assailing them behind with a chosen band of forty thousand men, marched through the mountain Œta. It happened, however, on that day, that the mountain was covered with such a thick mist, that the sun was darkened; so that the Phocenses, who guarded that passage of the mountain, did not perceive the Barbarians till they were quite near them. Hence some began to engage the Gauls, and others strenuously sustained their attacks; but, being at length vanquished, they were compelled to abandon their post.” (*Taylor's Pausanias*, lib. x. ch. xxii.)

As in our own day, Moustai Pasha, the Vizier of Scodra,

* Pausan., lib. x., cap. xxi.

† *Ib.*, lib. x., cap. xxii.

‡ In this the Gauls met with their repulse seven days after the action at Thermopylæ.

advanced with his Albanians from the depth of Thessaly towards the mountainous regions of Nevropolis and Carpenitza (or Callium), where the fate of Marco Botzaris was accomplished, so in antiquity 40,000 foot-soldiers and 800 Gallic cavalry, under the orders of Orestorius and Combutis, repassed the Sperchius, and threw themselves on Callium,* in order to penetrate thence into Ætolia, where they were directed to destroy all by fire and sword, with the view of dividing the Grecian forces at Thermopylæ, by recalling to the defence of their own homes those soldiers whom Ætolia had furnished for service in this general war. We see, in reality, that the Ætolians immediately returned to their country, and that reinforced by Achaean troops which had left Patras, and inspired by the desire of vengeance, they destroyed half of the force under the lieutenants of Brennus, who, after receiving into his camp the troops brought back to him by these generals, forced, with 40,000 men, the defiles of Mount Ceta, his march being favoured by a thick fog.

The Greeks,† informed of this passage of the mountain, immediately abandoned the Pass of the Thermopylæ, and the Gauls overran the country beyond the great mountain-chain, that extends from the Velouchi to Mount Ceta.

We have constantly attached but little importance to the military reasonings of the author of the *Voyage et de l'Histoire de la Grèce* (Pouqueville); and it is certainly not solely with the intention of refuting his opinions that these observations are written; but as errors are apt to multiply when we set out from false premises, we are led by the preceding explanations to pay momentary attention to the following passage (translated) from the *Histoire de la Grèce*: "We follow Brennus, after the first check which he received at the Thermopylæ, across Boeotia, ascending the valley of the Cephissus, and attacking Trachinæ, in order to enter the basin of the Sperchius. Being repulsed before that place, he meditated an invasion of Ætolia."

Now, after what has been stated, faithfully following Pausanias, who is as clear and precise in his narrative as can be desired, it is fully proved that Brennus *had encamped in the valley of the Sperchius*, and that the Greeks at Thermopylæ, and seven days afterwards at Trachinæ, *hindered him from crossing Mount Ceta*, which divides Thessaly from Boeotia. How, then, is it possible that this general could have passed through Boeotia, ascended the Cephissus, which flows *within* that province, and attacked Trachinæ *in order to enter the valley of the Sperchius*, out of which,

* The Greek author does not state what route these generals took in their march on Callium, where two roads unite, one from Kentira, and the other from Patradgik. It is probable that the Gauls arrived by the latter road.

† Pausan., lib. x., cap. xxii.

it is clear, he had not yet moved, before making his expedition into Ætolia—a manœuvre the aim of which was to divide the Greeks encamped at the Thermopylæ? . If, as asserted by the author (whose serious errors are here exposed), Brennus found himself in Bœotia, on the banks of the Cephissus, he must have *already* turned Mount Cæta and the Thermopylæ, and could, therefore, have attacked in the rear the Greeks who were still in the possession of this Pass, as the Persians had done long before, when it was defended by Leonidas. He would have had no need, then, for the attainment of this end, first to *invade* Ætolia.

All this portion of Greece has become invested with great interest in our day, as forming a part of the northern frontier of the Hellenic kingdom; it is, therefore, important to rectify whatever false notions may have gained currency respecting the ancient history of the country.

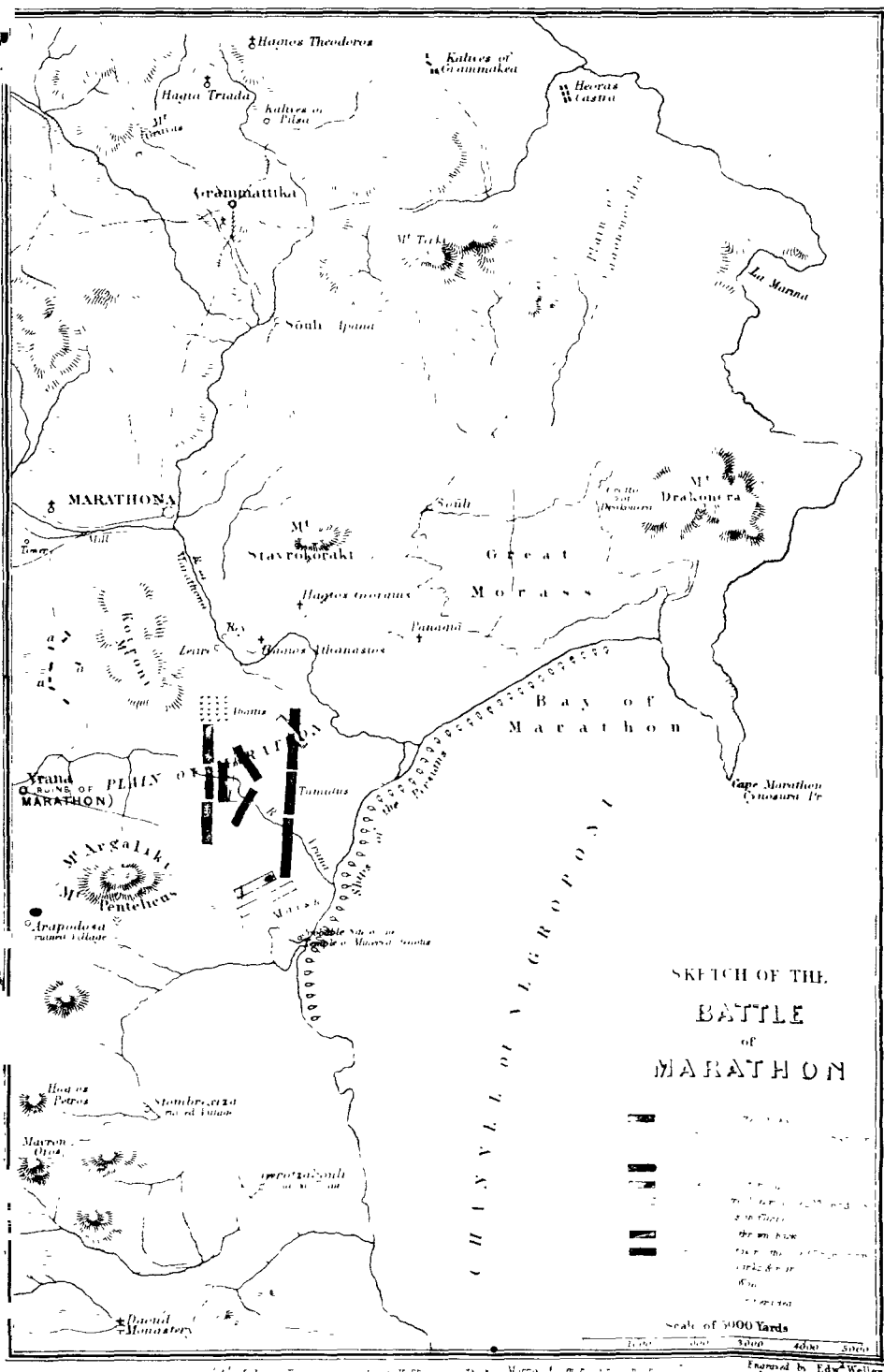
3. *Commentaries on the Battle of Marathon, (with Observations on Col. Leake's Map of Marathon, &c.).*

From the foot of Mount Stavrokoraki, which, belonging to the system of Parnes, forms the north-eastern limit of the valley through which the river of Marathon flows to the sea beyond the church of Panagia Mesosporitissa, is a distance of from 8000 to 9000 English feet, whilst the distance from the same church to the heights of Drakonera is almost twice as great. Between these points extends the great morass, in which, according to Pausanias,* who gives a detailed description of the event, the greater part of the Persians were lost that perished in the celebrated battle of Marathon.

An army, inferior in numbers, and unprovided with cavalry, having to cover the great plain of Marathon, and consequently Athens itself, against the invasion of a superior force descending from the elevated plateau near Rhamnus, or from Mount Drakonera, would have the choice of several defensive combinations, by transferring the struggle to a theatre on which individual courage might make up for want of numbers, and where the cavalry of the enemy might be unable to act with advantage.

There are only two defiles which lead from the plain of Tricorythus toward the field where the battle with the Persians was fought—one at the foot of Mount Stavrokoraki, the other between the morass and the sea. Between them, during the dry season, there might probably be found some tortuous passages; but an army which, trusting to the deceitful appearance of these meadows, were to engage therein, would not fail to meet with serious

* Pausanias, lib. i., cap. 32.



obstacles, on a ground dangerous in case of the slightest check or disorder.

The Greeks could not have chosen this field of battle. Uncertain as to the place where the enemy would disembark, they did not reach Marathon until after the descent of the Persians upon the plain.

However, (as Herodotus acknowledges,) the favourite battle-field of his countrymen was a plain, as being suitable to the deep order in which they were accustomed to fight, the principle of which was the phalanx, so inferior to the Roman legion, which in its turn could not be so efficient in tactics as the modern military organization, by means of which troops can pass with admirable precision from extended into deep order, and *vice versa*. To cover the capital of Attica in the face of an enemy encamped on the plain of Marathon, the strategic point to occupy is the modern village of Vrana,* at the bottom of the valley of the same name.

There are three roads which lead from the plain of Marathon to Athens, of which, (taking as the point of departure the great tumulus erected by the Greeks in memory of the heroes who fell in the engagement with the Persians.)—that by Mount Pentelicus and the convent of Daoud, and that by Vrana and Stamata, are nearly equal in length; the road by way of Marathona and Stamata being the longest of all. According to the ancients, the distance from Marathon to Athens is 140 stadia. I have found, in accordance with Gell ('Itinerary'), that it is nearly a seven hours' journey from the tumulus to that city.

Vrana, in its strategic relations to the capital of Attica, is a central position. An army encamped in the valley commanded by that hamlet, menaces the flank of an enemy desirous of effecting a passage by either of the two other routes. It can compel the enemy either to give battle or to remain inactive.

History abounds with examples attesting by the results the danger of a flank-movement before an enemy in position, who detects the faults of his adversary.

Though the Greeks gained a victory over the Persians, who had deployed *all their forces* on level ground, they would have had a still better chance of success if, in eagerness to march on Athens, the Median generals, trusting to their superior numbers, had engaged *a part of their troops* in the defiles of Pentelicus or of Parnes, leaving the *rest* exposed to an isolated action, which the Greeks, in such an event, either turning off to the left of Vrana, or else descending towards the marshes on the right of the tumulus, would not have failed to bring about.

Almost all the modern authors who have written on the Battle

* Vrana is on the site of the ancient Marathon. See subsequently the opinion of Colonel Leake.

of Marathon are obscure or incorrect * in the details of that memorable event ; and the extreme vagueness and inexactness of the ancient historians have naturally given rise to a chaos of opinions. It may be added, that the situation of the modern village of Marathona, in a valley separated from that of Vrana by the hill of Kotroni, has singularly contributed to confuse *non-military* travellers, who have been desirous to decide the question as to the positions held by the Greeks and by the Persians.

The opinions put forth in this dissertation, accompanied by a sketch of the movements on the field of battle, are in general altogether opposed to those which have been hitherto received ; and should they not possess all the profundity desirable in historic researches, they have at least the merit of being the faithful reflection of convictions formed on the spot. The account of the battle of Marathon by Herodotus is as follows (lib. vi. cap. cxi. &c.) :—

CXI. . . . The Athenians were drawn out in the following order for the purpose of engaging :—The war-minister, Callimachus, commanded the right wing, for the law at that time was so settled amongst the Athenians, that the war-minister should have the right wing. He having this command, the tribes succeeded as they were usually reckoned, adjoining one another (without an interval between them), but the Plataeans were drawn out last of all, occupying the left wing. . . . At that time, when the Athenians were drawn out at Marathon, the following was the case : their line was equal in extent to the Median line, but the middle of it was but few deep, and there the line was weakest ; but each wing was strong in numbers.

CXII. When they were thus drawn out, and the victims were favourable, thereupon the Athenians, as soon as they were ordered to charge, advanced against the barbarians in double quick time ; and the space between them was not less than eight stadia.† But the Persians, seeing them charging at full speed, prepared to receive them ; and they imputed madness to them, and that utterly destructive, when they saw that they were few in number, and that they rushed on at full speed, though they had no cavalry nor archers. So the barbarians surmised. The Athenians, however, when they engaged in close ranks with the barbarians, fought in a manner worthy of record. For they, the first of all the Greeks whom we know of, charged the enemy at full speed, and they first endured the sight of the Median garb, and the men that wore it ; but until that time the very name of the Medes was a terror to the Greeks.

CXIII. The battle at Marathon lasted a long time : and in the middle of the line, where the Persians themselves and the Sacæ were arrayed, the barbarians were victorious ; in this part then the barbarians conquered, and having broken the line pursued to the interior, but in both wings the Athenians and the Plataeans were victorious ; and having gained the victory, they allowed the defeated portion of the barbarians to flee ; and having united both wings, they fought with those that had broken their centre, and the Athenians were vic-

* The excellent work of Colonel Leake on the 'Demi of Attica,' lately published (when this was written), and in which are all the details desirable respecting the Battle of Marathon, was unknown to the author at the time of making these observations, which were in a great part dictated on the very field of the battle.

† In all probability Herodotus means the lesser stadium, the length of which is about 50 fathoms, and that he implies by this expression that they advanced not running, but at a quick marching pace.

torious. They then followed the Persians in their flight, cutting them to pieces, till, reaching the shore, they called for fire and attacked the ships.

cxiv. And in the first place, in this battle, the war-minister Callimachus was killed, having proved himself a brave man; and among the generals, Stesilaus, son of Thrasylus, perished; and in the next place, Cynaëgirus, son of Euphron, having laid hold of a ship's poop, had his hand severed by an axe and fell; and, besides, many other distinguished Athenians were slain.

cxv. The Athenians made themselves masters of seven ships, but with the rest the barbarians rowing rapidly back, and after taking off the Eretrian slaves from the island where they had left them (Egina), sailed round Sunium, wishing to anticipate the Athenians in reaching the city. . . .

cxvi. They then sailed round Sunium. But the Athenians marched with all speed to the assistance of the city,* and were landed in reaching it before the barbarians arrived; and having come from the precinct of Hercules at Marathon, they took up their station in another precinct of Hercules at Cynosarges; but the barbarians, having had to with their fleet off Phalerum, for this was at that time the port of the Athenians, having anchored their ships there for a time, they sailed away for Asia.

cxvii. In this battle at Marathon there perished of the barbarians about 6400 men, and of the Athenians 192; so many fell on both sides.†—(*Herod.*, *Bohn's Transl.*, by H. Cary, M.A.)

Herodotus does not mention the number of the forces engaged on either side: but Pausanias‡ and Cornelius Nepos§ inform us that there were at Marathon 9000 Athenians (and the latter adds 1000 Plataeans). The Persians had been transported into Greece, as Herodotus says, in 600 triremes, independently of the transports for the cavalry.¶

The breadth of the valley of Vrana, at its opening between the foot of Mount Pentelicus and the traces of the ancient road which

* The Athenians left Aristides in command of one tribe at Marathon to guard the prisoners and the spoil. The other nine tribes marched to the relief of the city.

† The Rhetoricians were not backward in exaggerating the numbers of the slain, and inscriptions dictated by vanity or by flattery attested that the Persians had lost in the battle 200,000 men!—*Suidas*, tom. iii. p. 228. . . .

Justin lib. ii. cap. ix. p. 94 writes that the loss of the Persians amounted to 200,000 men. "Ducenta milia Persarum proelio sine naufragio, amiserunt." I reproduce this passage, because Berniceus appears not to have understood it. This commentator, wishing to make Justin agree with Herodotus, pretends that our historian alludes only to those who were killed on the field, whereas Justin comprises those also who perished at sea by shipwreck; and he cites Diodorus Siculus, lib. xi. sect. 12 and 13. The facts are that there was no shipwreck, that Diodorus treats in his eleventh book only of the Expedition of Xerxes, and that the tenth book, in which the battle of Marathon was described, is lost. *Shipwreck* in the passage of Justin must not be understood literally: it is but a figurative expression. Notes sur Hérodote de M. Larcher 201, cxvii.; Erato, lib. vi. p. 463, edit. de lan xi. 1802, p. 39.

‡ Pausanias, *Messen.* c. 29; *Phocis*, c. 20.

§ Cornelius Nepos in *Miltade*.

¶ Justin and C. Nepos say that there were 1000 Plataeans. The former author counts the Athenians alone at 10,000 men. Plutarch *Parallel.* in *Datis* mentions only 9000 Athenians (Leake).

¶ Herodotus, liv. vi., cap. 99.

passes near the hill of Kotroni, is from 6000 to 6500 feet. About here, in my opinion, was formed the line of battle of the Athenians, who fortified their left flank with stockades (*abattis*).*

Plutarch relates that the Greek centre was composed of the two tribes of Leontides and Antiochides, or of about 2000 men, under the command of Themistocles and Aristides,† which, allowing 2 feet of space in front for each man, and supposing them to be drawn up two ranks deep, would give a width of 2000 feet to the centre of their line of attack.

Four thousand men on each wing four ranks deep, would also occupy an extent of 2000 feet in front on either side, which, with the front of the centre, "there being no interval," makes a total extent of 6000 feet, or exactly the width of the opening of the valley of Vrana.

Herodotus expressly says, as we have just indicated, that the centre of the Greeks "was but *few deep*; and there the line was weakest, but each wing was strong in numbers." The term *few deep*, however, is scarcely applicable to "two" ranks, the number of *two* ranks being too definite to warrant the expression "few deep;" and if we take into account the custom of the Greeks not to fight except in an order of much greater depth,‡ and the habit also of their historians—even of Thucydides, the most exact of all—scarcely ever to state precisely, in their military details, the numbers of any but the *heavy-armed* troops, it seems very natural to suppose that the 10,000 men who (are recorded as having) fought at Marathon were all heavy-armed soldiers, and were accompanied by from 10,000 to 12,000 light-armed troops, who occupied the rear files; so that the Greeks fought in columns four or five deep in the centre, and eight deep at the wings—proportions which correspond better than the numbers *two* and *four* with the terms in which the historian of Marathon treats of the weak and strong parts respectively of the Greek order of battle.

An examination of the Map will enable the reader to perceive that the general arrangement of the Greeks, as there indicated, is that which apparently Cornelius Nepos has intended to describe in the fifth chapter of his life of Miltiades. "Namque arboris multis locis erant stratæ, hoc consilio ut et montium tegerentur altitudine, et arborum tractu equitatus hostium impidiretur, re multitudine clauderentur."

* Corn. Nepos in Miltiade, cap. v. There are still found some olive and other trees at the foot of the hill of Kotroni, and the environs of Zefire and of Bey were in all probability formerly covered with trees.

† Plutarch in Vit. Aristid., p. 321.

‡ During the Peloponnesian War, for example, at Oropus, the Thebans, on the right wing of the Bœotians, opposed to the Athenians, were drawn up 25 men deep, while the latter were only 8 deep.

If, as M. Kruse has suggested in his plan of the battle of Marathon, according to the data of modern travellers, the Greek front of attack extended from the foot of Pentelicus to the scarped sides of Mount Stavrokoraki, the stockade (*abattis*) in this position (so well defined and protected by the almost perpendicular declivities of the mountains, which on both sides rose on the flanks of the Greek line) must have been situated *in advance* of their line of battle, and would in such a case have singularly impeded the rapid advance of eight stadia, which the Greeks made for the purpose of attacking the enemy.

This suggestion, besides being of little consequence on account of the small importance which belongs to the *abattis*, becomes moreover utterly valueless if the distance be measured from the foot of Pentelicus to Stavrokoraki, which is nearly 15,000 feet. How can it be supposed that the Greeks occupied this space with 10,000 men, when, with only a *single* rank, it would have required 7500 men to furnish the front of battle? The right wing of the Greeks, moreover, must have been absolutely resting on Mount Pentelicus. The nature of the ground determines this position.

When advancing against the Persians, upon the most level ground in the whole plain (the bed of the rivulet or brook of Vrana being only about a foot beneath its surface), the left of the Greeks was their only vulnerable point so soon as they had passed the *abattis* (stockade) which covered this flank of their order of battle.

If, taking another view of the question, it were to be supposed that the Athenian army occupied the breadth of the valley of Marathon, properly so called, in front of the modern villages of Zefire and Bey, for the sole reason that this valley retains the name of Marathon, whilst the other now takes its name from the hamlet of Vrana, the Persian army ought also to be placed more to the right than it is in the accompanying plan, and on the other side of the river of Marathon. In this case the Greeks, advancing eight stadia from their first position, would have been weak on *both* flanks, both of them being equally without natural support; besides which, the course of the river of Marathon, which has a pretty deep bed, would have been a great obstacle to the advance in proper order of their left wing. Indeed, this wing would undoubtedly have been broken in the rapid movement projected by Miltiades.* Whatever may be the military talent of a general, he will always prefer, if he have the choice, a ground favourable to the genius and the nature of the troops under his command.

Herodotus does not state what was the number of the Persians who fought at Marathon. He only informs us that "the Greek

* Colonel Leake, by demonstrating that Vrana occupies the site of the ancient Marathon, has solved the question, but his 'Demi of Attica' had not been seen by the author when this was written.

line was equal in extent to the Median line," and that "the space between them was not less than eight stadia," which establishes the position of the Persian line as extending nearly from the lesser marsh, at the foot of Mount Pentelicus, in the direction of the tumulus, their line being prolonged considerably to the right of this latter point.

Thucydides, who, in several parts of his history, treats of the Persian war, and even incidentally of the battle of Marathon, makes no mention whatever of the numbers engaged; but at a later period Cornelius Nepos * maintained that Datis had opposed to the Greeks 100,000 foot and 10,000 horse.† Such a force of cavalry could never have fought at Marathon. If we but consider the immense superiority of the modern marine, and the difficulties and expense in the transport of a single regiment of cavalry, entailed upon powers such as England and France, as well as the resources requisite for its embarkation, maintenance during the voyage, and subsequent disembarkation, there are strong grounds for doubting whether the Persians, under Datis and Artaphernes, could ever have embarked 10,000 cavalry horses. Much more reason is there to doubt the statements of the historians who make the whole army—the 10,000 cavalry inclusive—set out from the Aleian plain, in Ionia, and proceed from Ionia to Samos, then to Naxos to reduce the inhabitants to slavery, to Delos and Rhenus, and afterwards to all the other islands to levy troops (the cavalry and the 10,000 horses all this time going with the rest in their transports), and finally to Eretria and Marathon!

The following is the account given by Herodotus (lib. vi.) relative to the forces of the Persians in this invasion of Greece, and their means of transit:—

xcv. When the generals who were appointed left the king and reached the Aleian plain of Cilicia, bringing with them a numerous and well-equipped army, while they were there encamped the whole naval force required from each people came up:‡ the horse transports were also present which Darius in the preceding year had commanded his tributaries to prepare. Having put the horses on board of these, and having embarked the land forces in the ships, they sailed for Ionia with six hundred triremes. From thence they did not steer their ships along the continent direct towards the Hellespont and Thrace, but parting from Samos, they directed their course across the Icarian Sea, and through the islands.

In lib. vii., treating of the invasion under Xerxes, he says—

CLXXXIV. As far as Thermopylæ the army had suffered no loss, and the numbers were at this time, as I find by calculations, of the following amount:—Of those in ships from Asia, amounting to 1207 originally, the whole num-

* Corn. Nepos in Vit. Miltiad. cap. 5.

† Herodotus, lib. vi., cap. xciii. &c.

‡ These were only from the people of the maritime provinces, as appears from § xlviii.

ber of the several nations was 241,400 men, allowing 200 to each ship; and on these ships thirty Persians, Medes, and Sacæ served as marines, in addition to the native crews of each; this further number amounts to 36,210. To this and the former number I add those that were on the penteconters (vessels of 50 oars), supposing eighty men on the average to be on board of each; but, as I have before said, 3,000 of these vessels were assembled, therefore the men on board them must have been 240,000. This then was the naval force from Asia, the total being 517,610. Of infantry there were 1,700,000, and of cavalry 80,000; to these I add the Arabians who rode camels, and the Libyans who drove chariots, reckoning the number at 20,000 men. Accordingly the numbers on board the ships and on the land, added together, make up 2,317,610. This then is the force which, as has been mentioned, was assembled from Asia itself, exclusive of the servants that followed, and the provision ships, and the men that were on board them.

CLXXXV. But the force brought from Europe must still be added to this whole number that has been summed up; but it is necessary to speak by guess. Now the Grecians from Thrace, and the islands contiguous to Thrace, furnished 120 ships; these ships give an amount of 24,000 men. Of land forces which were furnished by Thracians, Phœnicians, the Fœdi, the Bottians, the Chalcidian race, Bryzi, Pœnians, Macedonians, Pœnethi, Amians, Pelopians, Megastians, and Achaïans, together with those who inhabit the maritime parts of Thrace, of these nations I suppose that there were 300,000 men; so that these myriads, added to those from Asia, make a total of 2,611,610 fighting men.

CLXXXVI. I think that the servants who followed them, and with those on board the provision-ships and other vessels that sailed with the fleet, were not fewer than the fighting men, but more numerous; but supposing them to be equal in number with the fighting men, they make up the former number of myriads. Thus Xerxes, son of Darius, led 5,233,220 men to Sepias and Thermopylæ.

CLXXXVII. This then was the number of the whole force of Xerxes. But of women who made bread, and concubines, and eunuchs, no one could mention the number with accuracy; nor of draught-cattle and other beasts of burden; nor of Indian dogs that followed, could any one mention the number, they were so many. Therefore, I am not astonished that the streams of some rivers failed, but rather it is a wonder to me how provisions held out for so many myriads. For I find by calculation, if each man had a cheux of wheat daily, and no more, 110,340 medimni * must have been consumed every day; and I have not reckoned the food for the women, eunuchs, beasts of burden, and dogs. But of so many myriads of men, not one of them, for beauty and stature, was more entitled than Xerxes himself to possess this power.

In my opinion there were very few, if any, Persian cavalry present at the battle of Marathon, and the vessels of the maritime provinces (§ xlviii.) simply transported the horses of the officers and the beasts of burden, which have always abounded in Oriental armies from the days of Cyrus and Darius down to the present time. Although the expedition of Datis and Artaphernes cannot be compared in point of greatness and importance with

* There were forty-eight cheuices in a medimne. The 110,340 medimni presuppose an army of 5,286,320 men; but the army was less numerous by 13,100 men. There is then an error in the number either of the medimni or of the Persian troops. Wherever it may be is of little consequence. (Notes of Larcher to the Hist. of Herod. Polyhym., lib. vii § 300.)

that of Xerxes, it is evident that the Persian monarch Xerxes experienced the difficulty of transporting cavalry by sea, because all troops of that arm who had left Asia for the second war in Greece went by land, the whole of the way to Athens. Besides, what would have become of the 10,000 cavalry in the *equal* extent of the two contending lines, one of which occupied only a front of from 6000 to 7000 feet? Would they have been placed *behind* their infantry to charge upon them instead of upon the enemy?

Or how was it that this cavalry (the first in the world of its time —“the cavalry of the warlike Persian nation, which, in order not to lose equestrian skill, scarcely ever went on foot”*)—did not charge with its 10,000 horse and cut to pieces the unprotected flank of the Greek left wing, advancing *eight stadia*, or nearly a mile, over the most level plain of Attica? Lastly, after the defeat at Marathon, where, on the side of the Persians, only 6400 men were placed *hors de combat*, how did it happen that the cavalry should have managed to embark *during the rout*, in the twinkling of an eye, to follow the whole fleet, which, without tacking about shore (having retaken with them the slaves of Eretria), doubled Cape Sunium for the purpose of attacking Athens? If that cavalry could not effect an embarkation when routed, what became of the 10,000 horses; for no author asserts that they fell into the hands of the Greeks, who left Aristides on the field of battle in charge of the spoil† after the rest of the army had marched to Cynosarges to hinder the descent of the enemy elsewhere on the shores of Attica?‡

The king Darius, besides, would hardly in the first instance have sent 10,000 cavalry against a small republic, on which he had only meditated making war, because the Persian queen, in a moment of caprice, had wished to be served by Greek slaves.§

These observations may generally apply to the estimates of numbers, which the ancient historians have made of so-called barbarian armies.

A great modern military genius, Napoleon Bonaparte,|| who was concerned with affairs of the East, has decided the question by

* See the Travels of Anacharsis the Younger.

† Plutarch in Vit. Aristid.

‡ See the opinion of the Rev. J. W. Blakesley, formed on philological grounds, in ‘Transactions of the Philological Society,’ 1854, January 13, No. I., pp. 1 to 10.

The jealousy which would have been excited at Athens by the truer view of the matter being insisted upon, may be guessed from the story told by Plutarch (Cimon, § 8). The sentiment of Sochares of Decelea: ὅταν μόνος ἀγωνισάμηνος, ὡς Μιλτιάδης, νικήσῃ τοὺς βασιλεῖρας, τότε καὶ τιμᾶσθαι μόνος ἀξίον, was doubtless shared by all the ἄνδρες Μαραθωνομάχαι.

§ Travels of Anacharsis the Younger.

Mém. de Sainte Hélène.

showing the absurdity of statements received respecting the numerical forces of the armies of antiquity.* In fact it is sufficient to consider the resources and the superiority of modern armies, and the difficulties entailed by the delays experienced by the marches of large bodies of troops through even the richest and most civilized districts, to be convinced of the impossibility of the progress of masses, such as the ancient historians treat of, through countries often barren and deserted. Almost all those historians exaggerate; but Herodotus, in this respect, leaves the rest far behind, for, if we credit him, Xerxes, in his great Median expedition, "led as far as Sepias and Thermopylæ 5,283,220 men," not taking into account the women employed in making bread, the concubines, eunuchs, Indian dogs, &c.

The authors who wrote subsequently to Herodotus have themselves recognised these exaggerations, and Ctesias limits the forces of Xerxes to "800,000 men, not reckoning the chariots."† Diodorus Siculus gives the same number,‡ Ælian 700,000,§ Pliny

* Even now there is current in Arabia nearly the same exaggeration of the strength of the armies of Napoleon, as formerly existed amongst the nations of the East relative to those of the Persian king when he marched to the conquest of Greece. We might fancy we were again listening to the tales of Herodotus. Men in all ages love the marvellous.

"Abou'l Féroué ('the man in far', called also Bounaberdi. He came about thirty years ago into Egypt with an army more numerous than ants, and more terrible than locusts. The soldiers that he brought with him were reckoned at a thousand and one *independent*, and it is said that he possessed the power of commanding the djinns or genii. It is, however, certain that he had found the ring of Solomon, by the aid of which he understood the language of birds, and could transport himself in an instant to distances greater than from the earth to the Pleiades. Every one knows that he was seen on the same day at Carro and under the walls of Jaffa.

"Various accounts are given concerning the motives of his expedition to Egypt. If we believe the general and most probable rumour, he undertook the war there in order to carry off the mistress of a bey of the Mamelukes. She was, it is said, a Circassian woman of extraordinary beauty. Her face resembled the full moon, and her figure a *beauté de lune*. She had a nose like the letter *L* *celif*, eyebrows like two *o* *noun* reversed, and a small mouth like the letter *o* *num*: in a word, she could captivate this most redoubtable warrior with a cord made of one of the hairs of her tresses, and render him her slave for ever. Abou'l Féroué became desperately enamoured of this transcendent beauty on the account which a Copt had given him of her charms, and he resolved to obtain her at all hazards. He had offered for her to her possessor ten provinces and a hundred rich and populous cities: but the Mameluke positively refused the offer, saying that he would never give up a Moslem woman to a man who believed in God otherwise than as the disciple of Mahomet Lilebeli Fedj'alow La' Uaki Sebjirkan.

"Then it was that Bounaberdi assembled a great army, with which he came to Egypt, to get possession of the beautiful Circassian. It is known that he vanquished the Mamelukes there, and pushed his conquests to the equator, and to the countries of Abyssinia and Soudan. But when he had obtained possession of her whom he adored, this woman convinced him that he followed a false religion; and Abou'l Féroué and all his army at once became Mus-ulmen." Tradition received from an Arab tribe on the shores of the Gulf of Suez. See Notes to the first Canto of the poem 'Napoléon en Egypte,' by MM. Mory and Barthelemy.)

† Ctesias in Persicis, § xxiii.

‡ Diod. Sic., lib. xi. § 3, tom. i.

§ Ælian. Histor. Var., lib. xiii. cap. 3. tom. ii.

788,000,* Justin 1,000,000,† from all of which numbers we must make a liberal deduction. Voltaire was one of the first to hold up to ridicule these extravagant estimates. Cornelius Nepos, who naturally followed the Greek authors, deserves on this account no greater confidence than they themselves. His estimate of the Persian infantry at the battle of Marathon at 100,000 must be a notable exaggeration: for if such a number ever engaged there, or if bodies of troops at all approaching the numbers stated by Herodotus were ever transported into Greece, how could Thucydides, who may be esteemed more trustworthy, have maintained that the Peloponnesian war had been greater than all preceding it,‡—itself truly a contest of dwarfs (in comparison with the wars of our times), in which the greatest force displayed by the Athenians amounted to only 13,000 heavy armed men,§ and in which we find the Lacedæmonians on two occasions suing for peace, in order not to lose 420 soldiers besieged in the isle of Sphacteria? ||

Herodotus indicates the number of the vessels which transported the Persian army to Marathon; and it may be said that Cornelius Nepos and the rest have been governed in their estimates by this number; but it is precisely the number mentioned that must be put in question, because the historian (Herodotus) knew how many men each vessel could contain, and he would not have recorded a falsehood easy of detection by a simple calculation. But supposing Herodotus ever so desirous of stating the truth, how could he have been able to ascertain it fifty or sixty years after the battle of Marathon (the epoch at which he composed his history), when we consider that in our own days, possessing, as we do, so many means unknown to the ancients for determining facts, it is necessary, in order to arrive at the truth, to scrutinise so many and often contradictory opinions? Thus, for instance, five or six years only after the siege of Missolonghi, an event of our own day, it was as-erted, and with such pertinacity as almost to enforce belief, that 100,000 Turks ¶ had laid siege to

* Plin. Hist. Natur., lib. xxxiii. cap. 10. tom. ii.

† Justin, Histor., lib. ii. cap. x. Notes de Larcher, Trad. d'Hérodote.

‡ Thucyd. Hist., lib. x.

§ Ibid. lib. ii.

|| Ibid. lib. iv.

¶ The author, in the interest of history, cannot refrain from opposing to the assertion "that the heroic garrison of Missolonghi defended itself against an army of 100,000 *barbarians*, commanded by *European officers*," the evidence afforded by the official reports of European agents who were eye-witnesses of the facts.

The investment of Missolonghi,^a which town was defended by a weak line of intrenchments and 15 small pieces of artillery—three to twelve pounders—was effected by a body of 20,000 men under the orders of Reschid Mehemet Pasha, of which number only from 7000 to 8000 were soldiers in the pay of the Sultan:

^a Green, Sketches of the War in Greece, Letter XLII., May 1825, and Letter XLV.

that place, whereas at no period were there more than 15,000 combatants in the united armies of Reschid and Ibrahim Pashas—

the rest, although all armed, and capable of repulsing a sortie, were composed of adventurers hoping for pillage, merchants, and that enormous train which follows the eastern hordes of war. All the latter were utterly useless for the real operations of a siege, conducted even in the Turkish fashion.

It is very difficult, unless by actual ocular examination, to gain an approximation to the truth with reference to the numerical force of the Sultan's armies. The generals of brigades are interested in deceiving their pashas, the pashas the grand vizier, and the latter the Sultan himself. If the reader, also, reflects that the Greeks, to enhance their exploits, naturally overstate the numbers of the enemy, he may form some idea of the obstacles that authors encounter in endeavours to be exact in their estimates.

The Greek garrison of Missolonghi, that is the men capable of bearing arms, never were more than 5000 soldiers. In engineering, it is reckoned that a regular fortress defended by good troops demands for its attack a force five times more numerous than the garrison.^b On this estimate the army of the Seraskier ought to have consisted of 25,000 men, and it contained 8000 combatants. Nevertheless it was a glorious act for the Greeks to have resisted even this number, diminished as they were by misery, and sheltered only by a bad wall and a narrow ditch a few feet deep. It is true that the Turkish artillery^c was miserably served; it was worse than that of the Egyptians, which arrived later, and which yet, after a cannonade of fifteen days, with large pieces, had not succeeded in making a practicable breach.^d

It should be added that several of the Albanian chiefs, having an interest in prolonging a war which was to them a source of profit, had a secret understanding with the besieged Greeks.

The vigour with which Reschid Pasha urged the operations against the place made these troops desert *en masse*, to such an extent that the vizier saw his army reduced to 3000 combatants, when Ibrahim and his Arabs, to the number of 11,000 or 12,000 effective troops, appeared at the siege, which terminated by the sortie of April 22nd, 1826, the last valorous achievement of the defenders of Missolonghi.

The effective force of the two Turkish divisions never, therefore, exceeded 15,000 men at the same time before the place; and such was the misunderstanding that prevailed between the Egyptians and the Albanians, that the former, after having taken the town, fired upon the latter to prevent them from entering to pillage it, convinced as they were of the treachery of most of the Epirote chiefs.^e

The Arabs lost from 2000 to 2500 men at this siege, most of them in the insensate attack on the little church upon the islet of Chisova, which was an absurd affair, prompted by vanity and rivalry between the Turkish and Egyptian commanders. Ibrahim led back 9000 men into the Morea.

The obstinacy of Reschid Pasha, who required the surrender of Missolonghi *at discretion*, prolonged the siege; but the Greeks subsequently refused the capitulation which Ibrahim offered to them on April 21st, on terms similar to those at Anatolia, which were scrupulously observed by the Turks.

The prolongation of the defence of Missolonghi must be attributed as much to the brave conduct of the garrison as to the ignorance of the Turks in the art of conducting sieges and the treachery of the Albanian chiefs. One or two European regiments would have attacked and carried the town at the point of the bayonet,

^b Napoleon, Mém. Camp. d'Italie, Siege de Mantone.

^c The artillery with the "armée d'occupation" of Reschid Pasha (Gordon. Hist. of Greece) consisted of ONE howitzer. Subsequently pieces of ordnance of different calibres were brought from Lepanto.

^d Green, Sketches, Letter L.

^e Ibid.

^f The Egyptians had proofs of this after the capture of the town. During the siege under Ibrahim, the Albanians were never employed except at the advanced posts, and not in the duties of the attack.—Green, *l.c.*

so true is it that men always exalt the present danger, and when it has gone by, still more exaggerate the past.

It will, I think, as to the troops of the king of Persia which fought at Marathon, be pretty near the truth if we estimate the cavalry as of very slight amount, and the infantry, both heavy and light, at the very most, at half of the numbers of Cornelius Nepos; that is at 40,000 or 50,000 "fighting" men, which is double the force allowed to the Athenians.*

Although it was not habitual to the Persians to fight in deep ranks, the circumstances would appear to have induced them to deviate from their general rule at the battle of Marathon, so soon as their leaders had resolved not to form detachments for acting against the weak points of the Greek order of battle. It certainly is wrong in action unless in special exceptional cases, to operate, *if the forces are equal*, with small detachments on the flanks or rear of the enemy; but this rule is not applicable to the

probably without firing a cannon shot at its insignificant ramparts.⁸ Singly considered, the defence was a brilliant achievement; but it will not bear comparison with the resistance of Saragossa, nor even with that of the great redoubt at the Moskowa, where the cavalry charged when the ditches were literally filled with assailants who had fallen under the fire of the Russians.

I will add one last observation concerning the *European officers*, whom M. Rizo alleged to have commanded the "*army of a hundred Ethiopians and barbarians*." It is an extract from a letter by Mr. Green, whose work, violently decried in a time of political excitement, has at length been acknowledged to contain a great deal of truth. As to his observations on the siege of Missolonghi, I have been able to confirm almost all of them by impartial researches. "Of the European officers, of whom so much has been said, there are few of any consequence with Ibrahim. Of the French the generality are surgeons, young students from the hospitals; Colonel Sives, known as Soliman Bey, is now at Tripolizza, and has not been here. The Italians are chiefly instructors or drill-officers, but they have merely the name, at least while they remained here, it is said, however, that they were of use in Egypt. The number of Europeans now here at Patras, and at Missolonghi with the army, does not exceed thirty, and I am informed that there are not more than double that number altogether in the Morea. Ibrahim Pasha is said to pay little attention to them, and in no instance, I believe, followed their advice, not even that of his chief engineer, Lieut.-Colonel Ramey, a Neapolitan."

* One of the reasons of Davis, the Persian general, for accepting battle was his desire to fight before the arrival of the Lacedæmonians. C. Nepos in Miltiades, cap. v., who by extraordinary forced marches reached Marathon some days after the victory of the Athenians, having accomplished 114½ stadia, or 140½ English miles, from Sparta to the neighbourhood of Athens, in the course of three days! The most remarkable forced march in modern times was executed by the British in Spain, who after a journey of 20 miles, marched 62 more from Malpartida de Plasencia to Talavera in 26 hours, each man having to carry a weight of from 50 to 60 lbs. It was Lieutenant-General Crawford's brigade, consisting of the 43rd, 52nd, and 95th regiments, which effected this march on July 30th, 1809. (Napier's Hist. of the Peninsular War, vol. ii., book 9, c. 2)

⁸ General Laudon, in the campaign of 1760, carried by a general attack of his troops the regularly fortified place of Schweidnitz, defended by 3900 Prussians. The Austrians scaled the forts and walls in open day, and made themselves masters of the town after four hours' fighting. General Laudon's order of the day ran, "*Les attaques ont été faites avec la bravoure, sans tirer une balle.*" Jomini, Traité des Opérations Militaires.

Persians at Marathon, where they were evidently far superior in numbers, and much less would it apply if they were provided with cavalry. It is necessary, however, to have served in or against Oriental armies, which have been almost stationary in their usages from the time of the Persian Empire down to our own day, to form any conception of the supineness and want of foresight which ordinarily characterise their proceedings.

A deep order might have given to the battle front of the Persians an extent about equal to that of the Greek line, if the former were posted between the marsh near the supposed site of the temple of Minerva Hellotis, and the river of Marathon.

It may be conceived that the Persian right, flying towards the ships and Cape Cynosura, suffered considerable loss by getting entangled in the great morass, where many were overwhelmed and destroyed * in the general disorder. The Persian left, in like manner, routed by the brigade of Callimachus, was completely broken on the uncertain and marshy ground into which the Greeks had thrown them. The defile between Pentelicus and the lesser marsh is very narrow (from 350 to 300 paces in width). On the retrograde movement of the right wing of the Greeks (after the victory of their wings) to succour their centre, it is probable that a part of their light troops occupied this defile, where the superior numbers of the enemy becoming ineffective, the light troops hindered the return of the Persians to the field of battle. It may also be believed that at the left wing of the Greeks a part of the light troops continued to menace the Persians in their flight, whilst the bulk of the wings, retracing their steps, decided the defeat of the Persian centre, the broken masses of which fled towards their vessels, which were so near the land that the Greeks captured several ships. This disposition, as regards a part of the light troops, appears probable, if it be considered that at the time when it took place the loss of the Persians—*which in all did not exceed 6400 men*—had not been very considerable, their centre being as yet victorious.

The greater part of the Persian fleet appears to have been drawn up, on the day of the battle, along the Bay of Marathon, to beyond the supposed site of the temple of Minerva Hellotis. The vessels being very near the land, as their build allowed, the troops were enabled easily to retire to them during and after the rout, which explains also why the Greeks "called for fire" to burn them. Their proper and safe anchorage must have been inside of Cape Cynosura, where the fleet was sheltered from eastern, north-eastern, and other winds, which prevail in those seas towards the end of summer, and often blow with great violence. The battle of Marathon took place at this season, about the 17th of August B.C. 490, according

* Pausanias, lib. i., cap. 32.

to M. Freret,* or about the 29th of September, according to the author of the "*Voyage du jeune Anacharsis*."† The same winds destroyed on the shores of Magnesia a great part of the fleet of Xerxes; for it "was shipwrecked by a furious tempest with a strong easterly wind, which the inhabitants of the neighbouring coasts call Hellespontines."‡ They were evidently winds from the N.E. or E.N.E.§

If the strategic merits of the disposition of the Greeks at Marathon be examined, it will be observed that they fought there in one comparatively thin and extended line, and nevertheless without a reserve. Here was an absence of the true principles of military art, unless it be supposed that Miltiades intimidated his enemies by the novelty, promptitude, and boldness of his manœuvres. It has never occurred to any one to admire the tactics of General Cuesta (always reckoned a general of very poor capacity) against Marshal Victor at the battle of Medellin. The Spaniards then, like the Greeks, fought in a single line *without reserve*; like the conquerors of the Persians, they advanced on the enemy at charging pace, traversing a considerable distance, the troops of Cuesta having the further advantage of outflanking considerably the left wing of the French. Marshal Victor, as soon as he had obliged the Spanish general to show his line of battle, changed his dispositions, both offensive and defensive, on the discovery of a total want of reserve on the part of the enemy, and owed a brilliant victory to this fault of Cuesta, which the latter could not repair, even by an imposing and rapid offensive movement of the whole Spanish line. ||

The proportion between the forces of the Greeks and of the Persians at Marathon was nearly the same as that between the Prussians and the army of the Prince de Soubise at Rosbach; ¶ but the Athenians obtained their victory, glorious though it was, only by a boldness approaching to rashness, and through the irresolution of the Persian troops on the wings of their line, which fled after a check attended with little bloodshed, without returning to the charge, when they saw the retrograde movement of the Greeks; whereas the soldiers of Frederick the Great covered themselves with greater glory by their coolness and courage, guided by the consummate skill of the greatest captain of his time.

* Toward the 6th Metageiton, Freret, *Mém. de l'Acad. de Belles Lettres*, tom. xviii.

† Toward the 6th Boedromion, 3rd year of the 72nd Olympiad. *Voyage du Jeune Anacharsis*.

‡ Herodotus, lib. vii., cap. 188.

§ Notes of Larcher, transl. of Herodotus.

|| See the detailed description of the battle of Medellin and the observations of Lieutenant-Colonel Napier, vol. ii., lib. viii., cap. 3, 4.

¶ The King of Prussia 22,000 men: the Prince de Soubise 50,000 men.

Lastly the disproportion between the forces of attack and of defence in the wars of the English in India against their native enemies was always much more considerable than the difference which existed between the numbers of the contending forces at Marathon. [The opinion of Mr. Hobhouse ('Travels in Albania') is very similar to that advanced in these Commentaries.—*March, 1839.*]

Observations on Colonel Leake's Map of Marathon, &c.

COLONEL LEAKE, by determining the site of the ancient Marathon as being that of the modern village of Vrana, has solved the essential point of the military question. In fact, the opinions put forth in the preceding dissertation, which was written before the author had any knowledge of the profound researches of the celebrated English geographer, have derived from these latter the strongest confirmation. The principal object to be ascertained was whether the right wing of the *Greek line of battle* had rested or not on the chain of rocks that runs from Vrana toward the sea; and the weighty authority of the author of the '*Demi of Attica*' places this fact beyond doubt. The question of the greater or less extent of the line toward the left is of secondary consideration; it depends on the depth of the order of battle in which the Greeks fought; and we think that in this respect we ought to persist as to the probable correctness of the observations already advanced.

In the opinion of Colonel Leake the Greek wings were only three men deep, and the centre two deep; the whole line being reinforced by the light troops, estimated at 10,000 men—that is, the same number as the *hoplite* or heavy-armed troops. In that case, however, to have a battle-front of nearly 12,000 feet in extent (from the foot of Mount Pentelicus to the river of Marathon, calculating two feet of space for each man), it must be admitted that Miltiades allowed "more" than two feet of space per man for those in the centre* (an arrangement which, considering that there were but two ranks of heavy-armed soldiers in this part of the line, too greatly weakened its strength). Moreover this disposition of the forces cannot be reconciled with the expression of Herodotus, who says "that the Athenians having actually engaged the Barbarians, their *closed* ranks performed memorable actions;" also, "that their wings were numerous and strong."

The left wing of the Greeks, supported though it was by the *abattis* at the foot of the hill of Kotroni, as we have supposed, or by other defences on the banks of the river of Marathon, was always, as the Colonel admits, the weak point, from the moment

* Leake, *Demi of Attica*.

that the offensive movement of the Greeks took place. The river of Marathon, although much deeper than the course of the rivulet of Vrana, was not nearly enough so to protect this left wing, which, in our general disposition of the two armies, as in that of the English author, is considerably outflanked by the right wing of the Persian army.

The first position of the Greeks, as we have sketched it, is even stronger than that extending as far as the river, which offers no obstacle to an offensive movement on the part of the Persians.

The Colonel estimates the force of the army of Datis and Artaphernes on the day of the battle at 26,800 regular infantry, and 6,000 cavalry: and he reckons the complete armament of the Persians at 177,000 men, the crews of the ships of war and the transports all being included.* Our own opinion as to the strength of the cavalry and its inaction (so improbable when opposed to infantry advancing over a plain) is already known; and it appears to us, for the reasons stated, as difficult to believe in the transport and long sea-voyage of 6,000 as of 10,000 horse. On this account, the estimate of the learned archæologist must, in our opinion, be subjected to considerable reduction in all its proportions; especially as we think that the number of triremes may be materially diminished. At the very most 100,000 men—regulars, light troops, sailors, retinues, and servants all comprised—seems to be the highest possible estimate; and that of 40,000 or 50,000 *fighting* men on land as the most probable at the battle of Marathon; for we repeat, it is precisely the number of the vessels indicated by Herodotus that we mistrust.

If, in reality, such immense masses had been acting against the Greeks, as Herodotus alleges in his description of the Median war, how could the more exact and trustworthy Thucydides have justly maintained that the Peloponnesian war had been *greater* than all the preceding wars? He says, “It will be seen by the circumstances that the war which I am describing (the Peloponnesian) is the greatest that Greece ever had.”—*Thucyd. Hist.*, lib. i. And again,

* Colonel Leake's estimate of the Persian armament is as follows:—

Regular infantry, 50 men in each one of 600 triremes	..	30,000
Cavalry	.. .. .	7,000
Rowers of 600 triremes, serving as archers on land	.. ..	90,000
A portion of the crews of the cavalry transports, serving on land as light troops	.. .. .	10,000
The remainder of the crews of cavalry transports	.. ..	10,000
Sailors on board of the triremes	.. .. .	30,000

177,000

But making deduction of at least one-tenth for deficiency of complement, desertion, sickness, accidents by sea, horses disabled, and garrisons at Naxos, Eretria, &c., the Colonel sets down the Persians on the day of the battle at 26,800 regular infantry and 6000 cavalry.

“ Besides, the *greatest* of all the preceding wars, which is that against the Persians, was decided by two engagements at sea, and two on land.”—*Ibid.* The Athenians, however, as we have already taken occasion to remark, had never in this “*great war*” (the Peloponnesian) more than 13,000 hoplitæ (*Thucyd.* lib. ii.), “ of whom 10,000 were citizens, and 3000 other inhabitants, not counting the light infantry, which was not in small number.”

If Thucydides had believed in the astonishing force of the Persian armaments, he would assuredly have spoken of it to heighten the heroism of his countrymen; but he studiously passes in silence the subject of their numbers on every occasion on which he refers to the war with the Medes. Nay, on the contrary, he expressly remarks, as a very clear acknowledgment of the habitual exaggerations of historians—“ So little curious are we to investigate the truth, and so easily content to suffer ourselves to be led by common fame. We shall not be mistaken, however, in adopting the arguments I have alleged, without crediting the fictions of the poets, or the falsehoods of the historians, whose main object is to tickle the ears rather than to tell the truth, and who advance statements without proofs, which do not fail to gain credit by degrees in the minds of people, though they be but fables.”—*Thucyd. Hist.*, lib. i. This was, indeed, a very bad compliment to Herodotus; and if Thucydides has not further exposed the exaggerations of that writer, it is only because his patriotic feeling as an Athenian was too much interested to permit him to do so, for he would thereby have inflicted a serious blow on the glory of his country.

Observations on the Map of Kruse.

The perusal of the dissertation on the battle of Marathon, and of the notes on the opinions of Colonel Leake, may be sufficient to convince the reader of the inexactness of the map of Kruse, and especially of its military dispositions.

First. The extent of the lines of battle is altogether disproportionate to that of the forces which were engaged in the action at Marathon. We know not where M. Kruse acquired the idea of his subdivisions of the Persian line into Medes, Sææ, Persians, and irregular troops. It is a mere fgment of the imagination; for such a subdivision is not mentioned by any ancient author as having existed on the day of the action.

Secondly. The tumulus of the Greeks is placed much too far from the sea. The opinion of Colonel Leake is, that this tumulus was erected on the spot where the greater number of the Athenians fell, or where the two centres encountered each other, at the first attack of the Athenians. We will add, that on our map this tumulus has been placed exactly opposite the centre of the Greek line, a circumstance which appears worthy of remark, on account of the tendency to symmetry which so generally characterises the public monuments of the ancients, and their appendages.

The church of Panagia Mesopotissa is not indicated in the map of Kruse. It was there, however, that Mr. W. Pankes found the remains of a single Ionic column, 24 feet in diameter, which, according to Colonel Leake, perhaps formed a part of the trophy of *white marble* erected by the Athenians

after the action, and which appears to have existed in the time of Pausanias. The church stands on the very spot where the great massacre of the Persian centre must (probably) have taken place, and where the victory of the Athenians was completed when they drove their enemies back to the shore and into the great morass.

Thirdly. The researches of Colonel Leake prove that the Grotto of Pan cannot be placed, as has been done by M. Kruse, near Inée, the locality wrongly occupied by the ancient Marathon in the German map. It is on or near Mount Stavrokoraki that this grotto must be sought for. Meanwhile the English archaeologist believes that he has found traces of the stables of Artaphernes* at a cavern on Mount Drakonera, the head-quarters of the Persians having been, at least during the first days,† to all appearance, and according to all military rules, on the elevated plain of Tricorythus. M. Kruse then is in error in placing the tent and the stables of Artaphernes close to the site of the Temple of Minerva Hellotis.

4. *Commentaries on the Battle of Sellasia, and the Strategic Movements of the Generals of Antiquity between Tegea, Carya, and Sparta.*

SECT. A. *Researches on the Site of Sellasia.*

Researches upon the hitherto unrecognized site of Sellasia have occupied many authors. Those who have desired at the same time to resolve the military question and to determine the position of Mounts Olympus and Eva have put forward only conjectures; especially M. de Beaujour (*Voyage Militaire de la Turquie*), who appears to have consulted the French map of the Morea before its publication, and Colonel Leake, who has thought that he could identify the Monastery of 'Aghios Seranda as erected on the site of the ancient Sellasia. In such a case, the Tzinzina river ought to be the Cenus, and the rivulet of Bassara, the Gorgilos—as is admitted by the celebrated English archæologist.

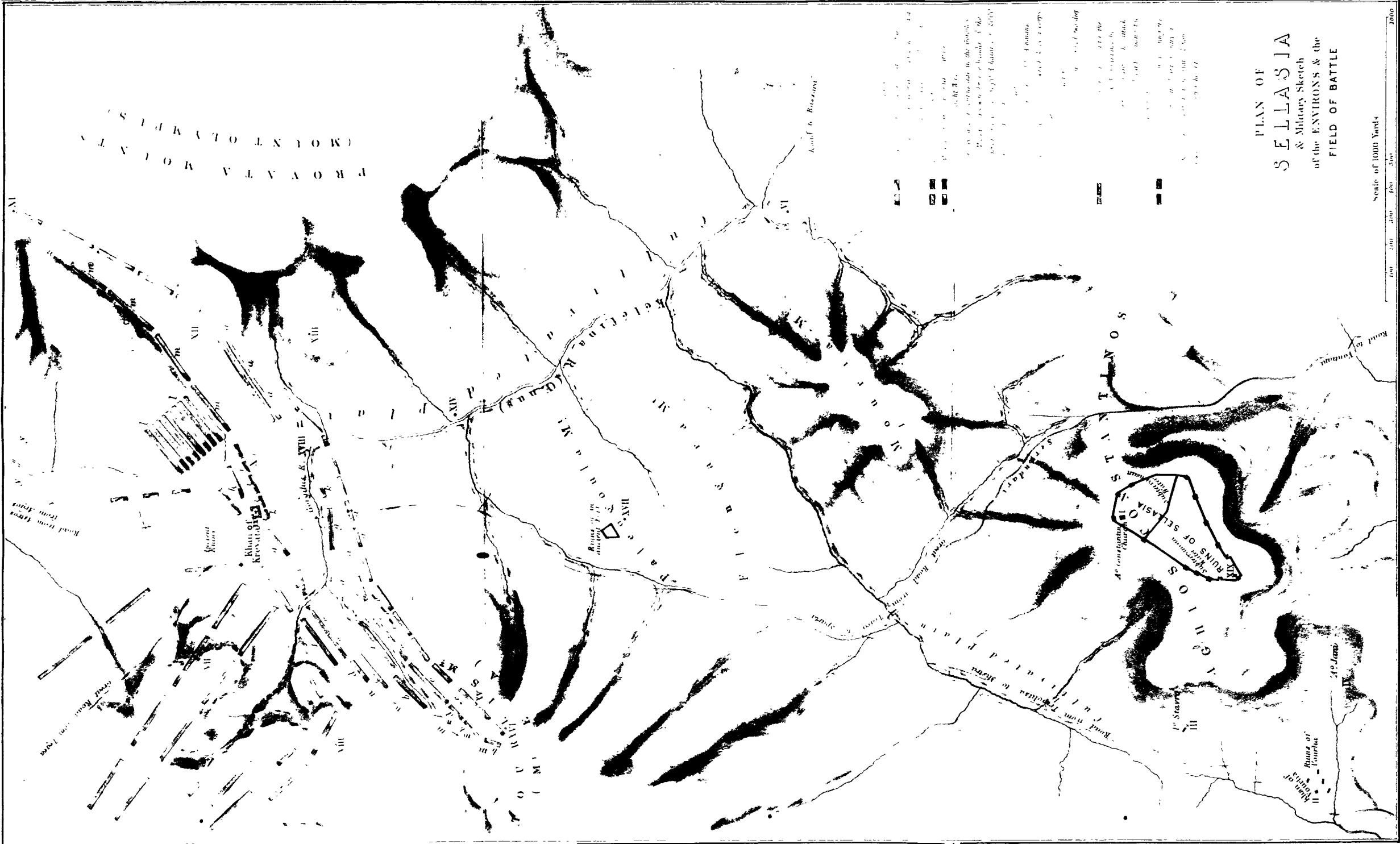
Prepossessed with the idea of the great anti-strategic détour, which, in this case, Antigonus must have compelled his army to make in its advance from Argos toward Laconia, I ascended the valley of the Cenus, or Kéléfina, from its mouth up to beyond the khan of Krévata, on the route to Vresthéna.

Struck with the natural strength of the position of Krévata, and its strategic importance, I sought for the site of Sellasia in its environs. The ruins indicated on the French map as the remains of this fortress appeared to me too insignificant. The entire surface of the small cone where the traces of an ancient fort appear, is only about 6000 or 7000 square mètres (7180 to 8370 sq. yds.). This is the eminence now known under the common designation of Palæogoula (old fort). Extending my examination to the elevated

* Pausanias, Descrip., lib. i., cap. 32.

† Of the week or nine days during which the armies remained in sight of each other.—G. S. B.





plateau of the mountain of 'Aghios Constantinos (Mount St. Constantine), my doubts gave way to a conviction that the site of Sellasia was there irrevocably fixed.

The accompanying map presents the exact plan of that celebrated fortress. Throughout a circumference of 1100 mètres (1203 yds.) of city walls, and of 630 mètres (689 yds.) of those of the Acropolis, I discovered the foundations, perfectly recognisable, of 11 towers, having each 10 mètres frontage, by 8 mètres in flank, and of one tower at the south-west extremity of the city, the proportions of which were 12 and 10 mètres. Near to the latter two entrances may be seen; those which are probably to be found in other places did not appear to me to be sufficiently recognisable to be marked on the Plan.

The walls, which are of the second period of Hellenic constructions, present almost in every part two layers of hewn stones, uniformly $3\frac{1}{2}$ mètres in width, or nearly 11 feet English. The hand of man, more even than time, has caused the disappearance of the enormous masses of wrought stone, which ought otherwise to have been found here: it is, therefore, not surprising that Colonel Leake should have seen at the convent of 'Aghios Seranda (two hours to the south-east) inscriptions having reference to Sellasia.

The dull sound of subterranean waters is heard distinctly at two places indicated on the Plan of Sellasia, where there are artificial caverns; their communication with the excellent and abundant springs at the church of 'Aghios Janis, at the foot of the rock of 'Aghios Constantinos, is highly probable.

The ancient highway from Tegea to Sparta, passing beneath Sellasia, turns to the south near Palæogoula, where it runs for a short distance in a west-south-westerly direction; it leads by Vou-tiani to the ancient bridge over the Eurotas, descends from this village into a narrow valley, and is commonly from 20 to 30 mètres in width, down to the banks of the Kéléfina (Ænus). Another route by Kurti lies also along the slope of the mountain. The present road from Tripolitza to Mistra proceeds from Palæogoula direct to the bridge of Kopano, past the khan of Vourlia. Here are to be found at intervals portions of a highway dating from the middle ages.

SECT. B. *Strategic Importance of the Position of Mounts Eva and Olympus.*

The position of Sellasia having been ascertained, the isolated mounts of Tourlis and Provata naturally present themselves as the Eva and Olympus of the ancients.

The Gorgilos is identified, at the foot of Mount Eva, as the stream which falls into the Ænus, at 250 mètres (273 yds.) south-

eastward of the khan of Krévata. Inconsiderable as it is, it deserves to be distinguished from the other small tributaries of the Cœnus, inasmuch as it is the only one which has water in summer derived from a spring.

Cleomenes might here have awaited the King of Macedon, who was advancing from Argos towards Laconia by one of the two principal routes—that of Tegea, or that which passes by (the modern) Arakhova, whither by the latter mentioned route he directed his march by the Mills and Kastri, or by Astros and 'Aghios Janis. The two first-mentioned highways bifurcate at the khan of Krévata; and the enemy could there be stopped in the excellent position of Mounts Eva and Olympus, which were indeed occupied by Cleomenes—who, however, as an able captain, caused the other openings into Laconia to be guarded by small detachments (*Polybius*, lib. ii.) in order to guard against a surprise. From his position, encamped (*à cheval*) on ridges commanding the two principal routes of communication, it was easy for him, at any point, to forestall his adversary, who operated upon the arc of a circle, one of the chords of which was occupied by the Spartan army. Antigonus, therefore, without wasting time in incoherent movements, which could only have imposed upon him useless or dangerous marches and countermarches, advanced directly upon Cleomenes, and encamped in the face of the Spartans, his front being covered by the Gorgilos, and his left flank extending toward the Cœnus. Polybius does not state by what route the Macedonians advanced; but he leads us to suppose it was by that of Tegea.

Different narratives have been left by that historian and by Plutarch, of the memorable event which decided the fate of Sparta upon the heights of Sellasia. (*See Polybius and Plutarch.**)

Before entering into further details, it is necessary here to offer some observations on the text of Polybius.

Firstly, as to the distribution of the forces. Antigonus had 28,000 foot and 1200 horse. To these Cleomenes opposed 20,000 men in all, disposed in defensive order on the Mounts Eva and Olympus. Polybius is not altogether clear as to the number of the Macedonian troops which encountered the Spartans upon each of these heights; but on collating Plutarch's account with his own, it would appear that Antigonus took with him the Macedonians, of whom Polybius reckons 13,000, but from which number must be deducted those armed with bronze bucklers, so that we may count 12,000 combatants as having accompanied the king, besides 5000 light troops, amongst which must be enumerated the Agrians and the Gauls, who are to be considered *par excellence*

* Polyb. Hist., lib. ii. cap. v.; Plut. in Vit. Philopœm.; do. in Vit. Cleom.

as Macedonian mercenaries. There remain, consequently, after deducting the cavalry and the 2000 foot who fought along with them, 8600 men for the attack upon Mount Eva. But Polybius mentions only the Illyrians, 1600 strong; the Acarnanians (rather Epirotes) and Cretans, 2000; the Achaïans in reserve, 2000; then the bronze-bucklered Macedonians, without indicating their number; and, finally, he nowhere accounts for 3000 mercenaries or allies, who are wanting to complete the number, and who evidently must have combated on Mount Eva. We have included these 3000 men in the Achaïan troops.

Secondly, the order of attack is not very clear, especially as regards the disposition of the forces on Mount Eva. Nevertheless, on comparing the two Greek authors, it is evident that the Illyrians and bronze-bucklered Macedonians were at the extreme right; that after them came the Acarnanians and Cretans; and then the Achaïans in reserve. The translators of Polybius (Hampton) and Don Vincent Thuillier (Folard), have incorrectly rendered the Greek text in translating ἐπὶ δὲ τούτοις τοὺς Ἀκαρνανῶνας καὶ Κρήτας ἐπέβαλε τούτων δὲ κατόπιν ἦσαν δισχιλίοι τῶν Ἀχαιῶν ἐφεδρείας λαμβάνοντες τάξιν (Polyb., Cas. 1670, B. 2, pp. 210, 211), by "the *second line* was composed of the Acarnanians and Cretans, followed by 2000 Achaïans as a body of reserve." If we read Polybius on the spot, we shall readily conceive how, as a military man, it would not be possible to speak of a *second line*, since the nature of the ground would not admit of such a disposition; whilst the Greek passage thus literally translated, "*After these* (that is to say, the Illyrians and the bronze-bucklered Macedonians) came the Acarnanians and Cretans, followed by 2000 Achaïans as a body of reserve," describes precisely a disposition such as the locality renders possible, and as has been traced on our plan of the battle of Sellasia.

Thirdly, there are two principal movements indicated on this plan: that of the Illyrians turning the left of Euclides, whilst the Macedonians of the right wing attack it in front, and are in turn taken in flank and rear by some light Spartan troops; and then the charge of Philopœmen to check this latter diversion.

Only the first of these movements is noticed by Polybius; but Plutarch *positively* states that the wing of Euclides *was turned*. The second movement is represented by the historian (Polybius) as a cavalry fight: but we are more inclined to follow the details of Plutarch, because it is probable that Philopœmen had drawn with him all his countrymen. Besides, a combined attack of cavalry and infantry against the light troops of Euclides, who had taken the Achaïans in flank, would lead more surely to the object in view. Philopœmen, having the means for making such an

attack, would certainly not have charged with some platoons of horse alone.

We pass now to the general action.

SECT. C. *Order of Battle of the Lacedæmonian General.*

Cleomenes, having 20,000 men, took with him 5000 light troops and the Spartan phalanx to occupy Olympus, and placing his cavalry, interspersed with infantry, on the sides of the road along the course of the *Ænus*,* he gave the command of the mercenaries posted on Mount Eva to his brother Euclides. Strong alike in his position and in his genius, he still took the precaution to entrench himself throughout his whole line,† which, according to Polybius, was equally good for defence and for attack. Posted upon the crest of the heights, from points XVI. and XV. in the direction towards XII. and XI. (plan of Sellasia) along an extent of about 2200 metres (2400 yards), he was equally formidable by the strength of his defensive front, and by the inclination of the ground in advance of the whole of his right, which menaced the left flank of the Macedonians, should they attempt to cross the *Ænus*, so decidedly that their crafty leader, after fruitlessly scanning at all points the admirable order of battle of the Spartans, despaired for many days of the success of an attack, notwithstanding his great numerical superiority.

If we calculate that a foot-soldier occupied, in the ancient order of battle, $2\frac{1}{2}$ feet frontage ($2\frac{1}{2}$ feet English), and that the phalanx fought 16 men deep, the disposition of the remainder of the Lacedæmonian infantry must have been 6 or 7 men deep.

SECT. D. *On the Order of Attack of the Macedonian General.*

Whether, as Plutarch alleges, on the authority of Philarchus, the Macedonian king had gained over some chiefs of the Spartan left wing—or whether, as Polybius maintains, the loss of the battle was mainly owing to an executive error of Euclides—Antigonous, whilst guarding against the menacing position of the right wing of Cleomenes, directed the bulk of his army and the elite of his troops towards his left, namely (comprising the great phalanx), about 12,000 Macedonians, 1000 Agrians, 1000 Gauls, 3000 mercenaries (infantry), making a total of 17,000 men, of whom 5000 were light troops. He opposed his 1200 horse with 1000 Achæians and 1000 Megalopolitans to the cavalry of Cleomenes, and he disposed in order of attack on his right 1600

* The present road is 250 metres (273½ yards) to the east of the *Ænus*.

† At x x x (Plan of Sellasia) may still be seen remains of ancient entrenchments.

Illyrians, supported by the bronze-bucklered Macedonians, with 2000 Acarnanians (or rather Epirotes and Cretans), and 5000 Achaïans, of whom 2000 were in reserve.

The Illyrians had penetrated, during the night, to the fork of the Gorgilos, at the foot of Mount Eva, where they remained in ambuscade. Antigonus,—on the left,—having posted as the advanced guard, his mercenaries and light troops, redoubled his phalanx in depth on account of the narrowness of the ground, not wishing to extend the lines of his heavy infantry along the rocky and uneven ground on his left wing (which at first was reclined backwards), making only some feeble attacks with his light troops, and holding his cavalry back until the movement of his right wing should be crowned by some signal advantage. The king (Antigonus) commenced the attack on his extreme right with the Illyrians and bronze-bucklered Macedonians, followed by other troops of that wing, who in their turn were supported by the Achaïan reserve advancing towards the Gorgilos. There the Achaïans were taken in flank and rear by the light infantry of Euclides (*a*), and placed in a very dangerous position, from which they were extricated by the brilliant charge of Philopœmen (*g. k*). This detached movement, by disengaging the entire right wing from its perilous situation, decided the defeat of Euclides, and obliged Cleomenes, in order to compensate this disaster by a bold manœuvre, to advance from his entrenchments with the Spartan phalanx, by a movement of the left flank of his right wing, followed by the remaining troops of his right and the cavalry of his centre: a movement which, after an obstinate and alternately favourable contest, was followed by the complete victory of Antigonus, who, closing the files of his deep column, overthrew the Spartan phalanx, and drove them beyond * their entrenchments.

SECT. E. *On the Isolated Charge of Philopœmen.*

The charge of Philopœmen, made before the concerted signal for the general attack of the centre and left of the Macedonians, decided the victory of the right wing of Antigonus. The young

* The words here, "ἐκ τοῦ," must be translated "beyond," and not "out of," since Cleomenes, who had already left his entrenchments to attack the Macedonians, was driven by them *back* to his original position.

Plutarch relates that the Lacedæmonians had progressively pushed their offensive movement to nearly five stadia in advance: but Polybius asserts with more probability, considering the superior forces of Antigonus, that after the shock of the hostile phalanxes, sometimes the Macedonians yielded to the valour of the Spartans, and again the latter gave way before the strength of the Macedonian order of battle.

It may be, nevertheless, that some isolated bodies of light troops were driven towards *η η η* (Plan of Sellasia), nearly five stadia (about 800 metres, or 875 yards, beyond the entrenchments of Cleomenes.

Megalopolitan, gifted with military tact, after having fruitlessly urged upon the royal commanders the necessity for an attack to paralyze the effect of the dangerous movement of the light troops of Euclides which had taken the Achæians in flank and rear, led on his fellow-citizens and attacked the enemy on his own responsibility. Polybius describes a conflict of cavalry, which recalled the light Spartan troops to the assistance of their brigade of horse; whilst Plutarch relates, in minute detail, how his hero defeated also even the light infantry. But Philopœmen, according to the narrative of his contemporary, having drawn with him his fellow-citizens—of whom, in the enumeration of the forces, 1000 were armed like the Macedonian infantry, whilst their cavalry must be comprised in the 300 select Achæian horse—it is evident that “all” the Megalopolitans followed their young and daring chief, unappalled by the boldness of the movement and the difficulties of the ground—circumstances which apparently prevented the principal chiefs of the right wing from acting, at least as much as the fear of doing so before receiving the orders of the king.

Antigonus, after the battle, having informed himself as to the isolated attack entered upon without his orders, the general of the cavalry endeavoured to excuse himself by asserting that it was made against his will by a headstrong young soldier. “General—replied the king—that young man has conducted himself like a great captain, and you like a young man!”

SECT. F. *On the Executive Error of Euclides.*

The defensive dispositions of the left wing of Cleomenes were excellent; but his brother, a less skilful soldier than himself, did not know how to profit by them. Seeing the movement of the Macedonian right wing “across” the ravine of the Gorgilos, he ought “at that moment” to have attacked the enemy from above, instead of losing the advantage of the position by permitting him to advance to the “summit” of the height occupied by his own troops, to combat there on equal terms, and to be thrust, in his own turn, into the ravine behind him (*z z z*, plan of Sellasia). The excentric movement of the Illyrians and the Acarnanians to outflank the left of Euclides, which Plutarch mentions, carried them (by *m m m* and *n n n*) on the flank of the Spartans; and whether the heights (*xvi.* and *xv.*) were yielded to them by Demoteles, or whether they were taken by assault, no sooner did Cleomenes (placed upon the eminence *xii.**) see the Illyrians and Acarnanians masters of his extreme left, than he judged his brother to be lost, and commenced his grand offensive movement to recover the day.

* Plutarch, *Life of Cleomenes.*

SECT. G. *Loss of the Lacedæmonians at Sellasia.*

The loss experienced by the Spartans at Sellasia was enormous. Of 6000 Lacedæmonians, only 200 escaped the sword of Antigonus. In reality, driven beyond their entrenchments on the right, taken in flank by the victorious division descending from Mount Eva, they were lost without remedy, being forestalled upon their line of operation. If Cleomenes had not considered his affairs desperate, and if his loss had been less considerable, he might have hoped to arrest the enemy in the fine position of Sellasia itself, where two lines of defence of notable strength run across the great route. An enemy debouching from the high valley of the Cénus towards Sparta, would have no alternative but to force these lines in front, or to turn them by flank movements, always dangerous and almost always fatal, if an enemy has to be dealt with who, in point of strategy, knows the value of time and distance.

SECT. II. *Parallel between the Battles of Sellasia and Blenheim.*

The author next enters upon a discussion of the parallelism which had been set up between the battle of Sellasia and that of Blenheim; but he shows that those two military events in no wise resembled each other. At the conclusion of this section he remarks:—"If we may justly compare the brilliant manœuvres of the Duke of Marlborough and Prince Eugene of Savoy with the grand conceptions of Antigonus, we must not place in parallel the faults of Marshal de Tallard and the fine dispositions of Cleomenes; so true is it that we cannot too much admire either the victorious Macedonian or the vanquished Spartan."

SECT. I. *Highway from Thyreatis into Laconia.*

Sellasia not being at the convent of 'Aghios Seranda, but situated very near to the Khan of Vourlia, the great highway followed by Pausanias in his journey from Thyreatis into Laconia, could not lead by Kastanizza, as Colonel Leake has supposed, but rather by Kastri or Meligon to 'Aghios Petros, Arakhova, &c.

The following is a translation of the words of Pausanias: *—"Proceeding from the Hermæ, the country is full of oaks; the place is called Scotita. At a distance of ten stadia to the left of the road is a temple of Jupiter Scotitas; a little further on, in the direct highway, is a statue of Hercules, on the left side of the road, with a trophy erected, it is said, by Hercules when he

* Pausanias, in Lac., lib. iii., cap. x.

killed Hippocones and his sons. A third turning, to the *right* of the highway, leads to Caryæ and to the temple of Diana. The place is dedicated to Diana and the Nymphs; and here is a statue of Diana Caryatis in the open air. Here also the Lacedæmonian virgins celebrate their annual dances, and one peculiar to the country."

"Returning into the high road and continuing the journey, we meet with the ruins of Sellasia, which was taken by the Achæians when they had defeated the Lacedæmonians under Cleomenes, the son of Leonidas. At Thornax (ἐν δὲ Θόρνακι), where you arrive afterwards,* there is a statue of the Pythian Apollo, made like the statue of Apollo at Amyclæ, and beyond Thornax is the town of Sparta."

Information which I obtained accidentally at Vresthena from a Greek priest, who formerly, as a soldier, had served for a long time in Kynuria, and thoroughly knew the country, caused me to conjecture that the locality described by him under the name of Phonomenus (φονομένους), "the killed," must be the place of the tombs of Hippocones and of the trophy of Hercules—a supposition confirmed by a singular tradition, which has been perpetuated from the earliest ages of Grecian antiquity to the revival of learning in Greece.

A decided opinion, though obscurely expressed, that the *three* frontiers met at the Hermæ and at a caryatid figure, was communicated to me by the same priest, and served as a guide to me in the darkness of my inquiry. We shall follow Pausanias in his description of the triple frontier at the Hermæ. (Corinthiæ, lib. ii. cap. xxxviii.)

"Beyond those towns (Athene, Neris, Eva) rises the mountain in which are contained the frontiers of the Lacedæmonians, toward the Argives and the Tegeans; the frontiers are marked by the Hermæ (boundary-stones) in marble, which give name to the place where they are found—'ἔστι δὲ ἀπ' αὐτῶν ποταμὸς καλούμενος Τάνος.' Thence comes the river called '*Tanus*,' which is the only one descending from Parnon on the side of the Argives, and which falls into the gulf of Thyreatis."

We proceed successively to draw attention to the different natural features and the monuments mentioned by the traveller of antiquity, and to describe the remains of the latter, as they were found to exist by the author of these notes in his journey of 1834.

* Colonel Leake thus translates this passage: "The next place in advance is Thornax." In the Archæological Maps of Müller, as well as in the French map, a mountain named *Thornax* is laid down, according to a construction at variance with the meaning of Pausanias. (See the note on Thornax.)

PLANS
of Several Antiquities re-discovered
in
LACONIA & CYNURIA
in following
the Route of Pausanias
from
THYREATIS TO SPARTA

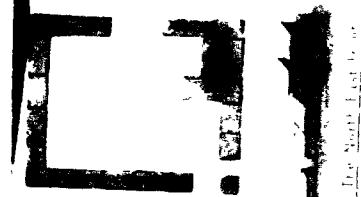
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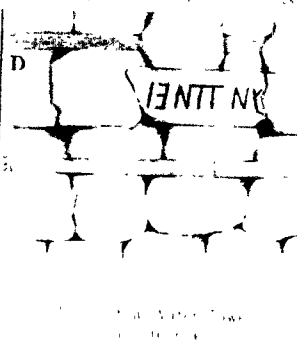
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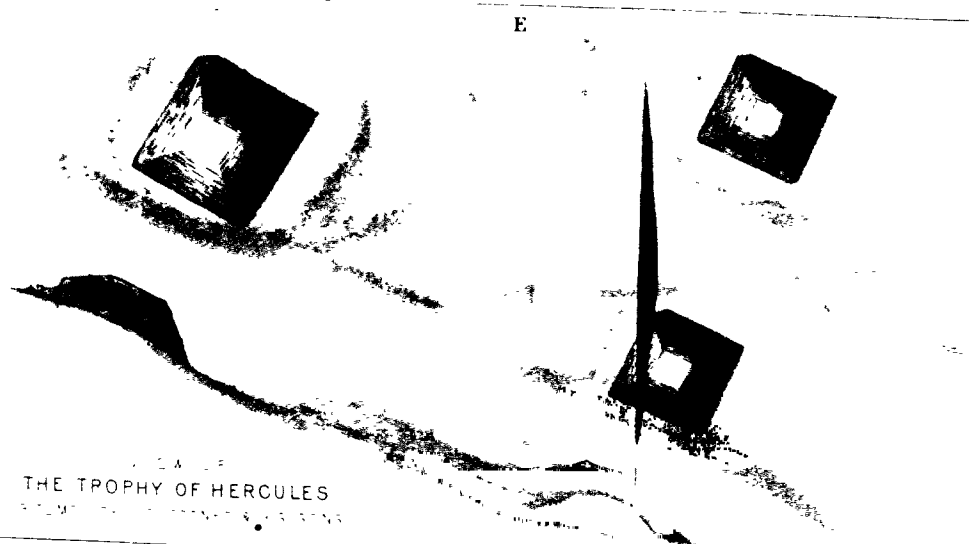


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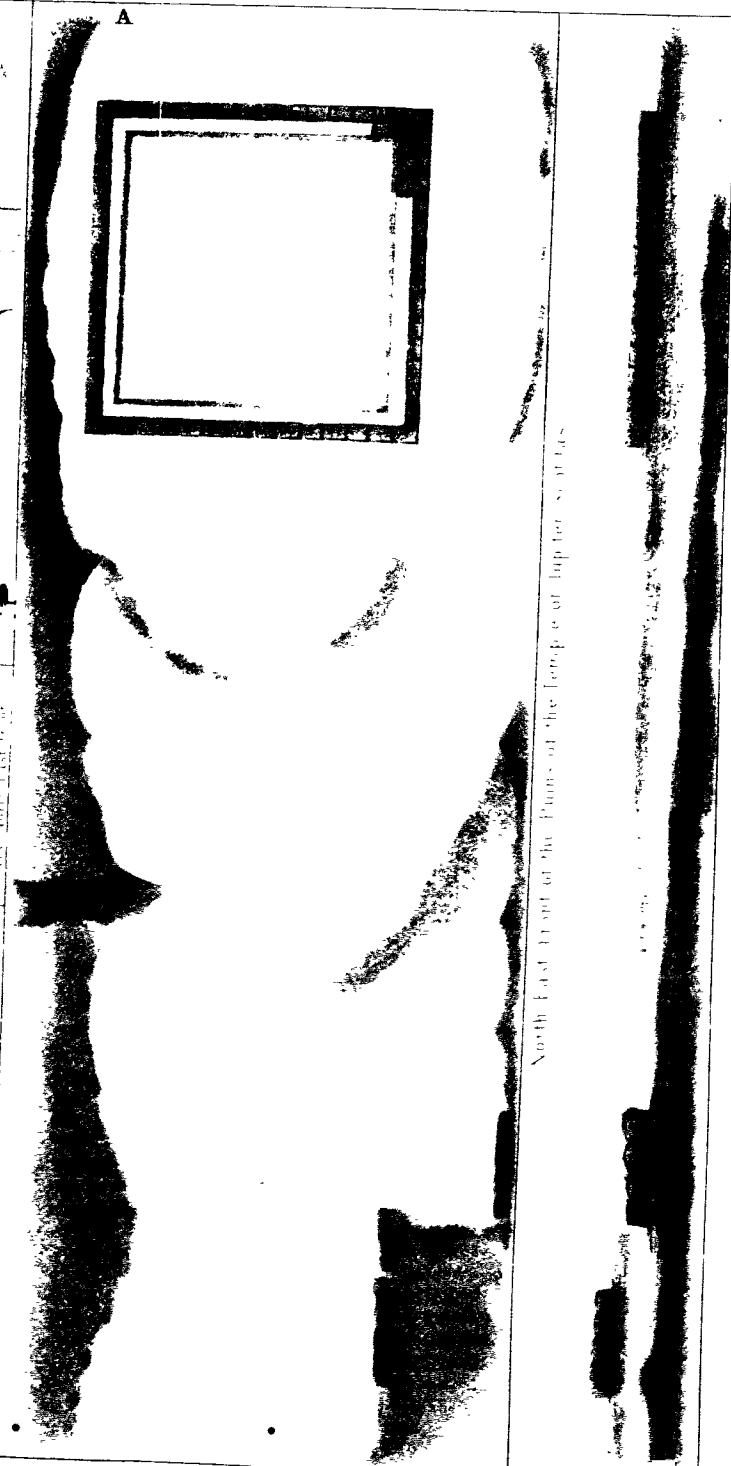
THE NORTH TOWER
TO THE NORTH

E



THE TROPHY OF HERCULES

A



North East Front of the Temple of Jupiter Sparta

SECT. J. *On the Tanus and the Triple Frontier at the Hermæ.*

The natural frontier of Laconia toward the countries of the Argives and the Tegeans is between Castro-tys-Oreas and the village of Meligon, at from 500 to 600 mètres (547 to 656 yards) north-east of the fortress. The right bank of the Elipida, or river of Platanos, is there bordered by high-peaked mountains; on its left bank begins a gentle descent and a general fall toward the Thyreatic gulf. Castro-tys-Oreas is 400 mètres (437 yards) southward of the high road from 'Aghios Petros to Meligon and Astros; and opposite to this castle, at 150 mètres to the north of the highway, are the principal sources of the Elipida, which immediately afterwards precipitates itself in cascades into its channel towards Platanos, where it supplies water to the mills at all times of the year. A little beyond Platanos it is joined by the river of Kastanizza, and it afterwards enters the sea at 'Aghios Andreas.

The Elipida, as Colonel Leake has already observed, is evidently the Tanus, which is the only channel here having water in summer, and on that account deserving the name of a river. The French geographers have taken the river of Loukon, rising at 'Aghios Petros, for the Tanus, probably by reason of its course; but the latter is *without water* during six months of the year, and has its source toward the site of the temple of Scotitas, and not at the Hermæ. Either, therefore, Pausanias is incorrect, or the Elipida is the Tanus, and takes its rise 500 mètres (547 yards) before arriving at Castro-tys-Oreas, the Hermæ being on the high road at the natural frontiers. The river Loukon does not in any way realise the latter description.

About half way between Castro-tys-Oreas and Meligon, upon the summit of a small hill, are the ruins of an Argive watch-tower, the plan of which is presented in the sketch.

SECT. K. *Temple of Jupiter Scotitas, and the Oak-Forest of Scotita. The Trophy of Hercules*

The road from the Hermæ, at the sources of the Tanus (or Elipida) towards Sparta, leads straight by the modern villages of 'Aghios Petros and Arakhova. Indeed, the most practicable route from Parnon, in this direction, is between these villages, the former of which is situated on the eastern declivity of Mount Parnon, and the latter on its western side. The distance between Aghios Petros and Arakhova is about an hour and a half. On leaving the Tanus, the country begins to be wooded about three quarters of an hour or an hour before reaching 'Aghios Petros; and the oak-forest, properly so called, extends to beyond Vambakou on the south (*see the map of Cynuria*), as far as the village of Vourvoura to the north, and to the confluence of the river of Vresthéna with the

Œnus to the west. This fine forest diminishes annually in density as well as beauty, in consequence of the cutting down of timber for building purposes and for fuel.

The site of the temple of Jupiter Scotitas in this forest, six stadia on the left of the high road, is exactly at this said distance on the left of the bridge of 'Aghios Petros. The present ruins are those of which the dimensions are given in the sketch. The peasants of the neighbourhood have, in a great measure, destroyed the materials of the temple by cutting and breaking the beautiful blocks (which are of very hard limestone) into small pieces, partly for the construction of their houses and partly to sustain the terraces of their fields, or else to form their boundary walls.

It takes three quarters of an hour to walk from the bridge of 'Aghios Petros to the place now called *εἰς τοὺς φονημένους*, "the killed," almost half way between that village and Arakhova. The three pyramids on the left of the road, in the proportions indicated (A, letter E), are the remains of the monument, called that of Hercules, and erected in memory of his victory over Hippocones and his sons. The tradition relative to it has escaped oblivion, because from day to day, and from age to age, Parnon has been crossed by these defiles, and the traveller has continually seen this monument of antiquity.

SECT. L. *On the site of Caryæ.*

As no ancient author has recorded the distance from Caryæ, on the right to the high-road from Thyreatis into Laconia, we must have recourse to other means to verify its site. These are furnished by the military movements and the encampments of Quintius and of Philopœmen, and also by the description of the localities of this region by Pausanias. In a country deficient of water, the movements of armies are regulated by calculations of the supply of this principal necessary of military life. It is a general rule, and one which gives great facility in researches of this nature, always to take into consideration the marches of the commanders of antiquity, in order to arrive at safe or nearly certain results. As we are here only concerned with a description of the route taken by Pausanias, we need but observe that the "indication" on our map of the site of Caryæ exactly corresponds with the accounts of the military movements reported by Livy. I will add that the parts adjacent to the present ruins on the banks of the river of Vourvoura, and the position laid down as that of the temple of Diana, on a slight elevation in the middle of the plain, present one of the most charming landscapes of that part of the Peloponnesus, — so much so, indeed, that this place, by its fertility, beauty, and freshness in summer, considering the elevation of its plateau,

deserved to be chosen for the festive assemblies mentioned by the Greek traveller.*

The ruins of Caryæ, situated on the borders of the plain and of the mountain, are those of a pretty large town; and in the spots marked *a—a—a*, may be seen on the rocks long traces of chariot wheels.

We shall presently have an opportunity of recurring more particularly to Caryæ, when treating in detail of the strategic movements of the ancients between Tegea and Sparta; but first we will continue to follow Pausanias down to his arrival at the last mentioned city.

SECT. M. *On the Temple of Apollo at Thornax.*

“After returning into the high-road, and continuing the journey, we meet with the ruins of Sellasia, which was taken by the Achæians, when they had defeated the Lacedæmonians under Cleomenes, son of Leonidas. At Thornax, which is the next place reached, there is a statue of the Pythian Apollo, &c.”†

The road from the ruins of Sellasia to Sparta leads by the modern village of Voutiani, and the ford of the Œnus, near the hamlet of Pavleica. At Voutiani this road divides, or rather, the ford may be reached by two roads. One of these immediately descends into the bed of a rivulet, (nearly always dry,) being a tributary of the Œnus, and falling into it almost perpendicularly. The other road, somewhat more to the west, runs parallel to the first, but over the top of the mountains, which from Voutiani slope towards the Œnus and Eurotas, as far as the villages of Kourti, Kokla, &c., where the plain, properly so called, commences. It is at Kourti, precisely on the limits of the plain and the mountain, that we find on one of the last undulations of the ground, at 120 mètres (131 yards) westward of the road, the ruins of the temple of Apollo, a sketch of which is to be seen in the plan indicated by the letter C: and this position corresponds exactly with the description of the site of Thornax given by Xenophon‡ in his narrative of the expedition of the Thebans against Sparta after the battle at Leuctra. According to this passage, Thornax could not be a mountain, as indicated in the archæological map of Müller, and in the French map of the Morea. Several houses (at present in ruins) of the hamlet of Kourti were constructed from “ancient stones,” and materials of the temple are found in many churches on the banks of the Eurotas, and on the left bank of the Kéléfina (Œnus).

* Paus. Lac., cap. x.

† Ib., cap. x.

‡ Xenophon, Hist. Græca, lib. vi., cap. v.

SECT. N. *On the Strategic Movements of the Ancients in that part of the Peloponnesus sketched in the annexed Map.*

Besides the campaign of Epaminondas against Sparta, antiquity furnishes narratives or mention of several important deeds of arms which have been achieved in the territorial triangle comprised between Tegea, the sources of the Tanus, and Sparta, or more properly speaking, between Caryæ and the two last named points.

It is justly considered of importance to determine with exactness, and either according to positive indications, or by the best founded calculations of probability, the different military positions; first, because by these means we shall at once be enabled to gain fixed points to start from in our ulterior researches,—and in the next place, with the view of clearing up several passages in the esteemed work of Colonel Leake, who, by mere accident, followed the road from Astros by the defile of Kastanizza to Sparta, instead of taking the road of 'Aghios Petros, where he would doubtless have found the same monument and ruins which the author of these Commentaries has been enabled to discover.

It is unnecessary to insist on the discrepancy which must have presented itself to the mind of the learned English archæologist in his endeavours to recognise the ancient sites. He himself acknowledges that, in order to make, for instance, the position of Hermæ (which he supposes to have been situated in the defile of Kastanizza*) agree with the Hermæ on the frontiers of Laconia, Tegeatis, and Argolis, he is obliged to introduce two different lines of frontier.

“It is no objection to this conclusion (of the Hermæ being in the pass of Kastanizza) that Pausanias says *in the same passage*, that the Hermæ in Mount Parnon were the Lacedæmonian boundary towards the Tegeatici as well as the Argeia. A Hermæum in the pass of Kastanizza could indeed ‘not’ have separated Laconia from the Tegeatici; but there may be *another* Hermæum on the Tegeatic frontier towards Vervena and the sources of the Alpheus; on the ridge between Vervena and St. Peter’s (‘Aghios Petros) there may have been a common boundary of all the three districts.”

This last observation, the result of the author’s knowledge of ancient topography, is extremely just and judicious; and a glance at the map, and the notes made on the threefold frontier and the sources of the Tanus, will convince the reader, that fixing the position of the Hermæ near Meligon is the only solution of the different questions belonging thereunto, and especially their position relative to that of Caryæ. Before entering, however, into a close dissertation on the situation of that place and of its environs, we

* Leake’s Travels in the Morea, vol. ii., p. 524.

MACEDONIA AND GREECE Antiquities and Monuments BETWEEN THE HELLESPONT & BULGARIA Explaining the Sites and Monuments IN THAT PART OF GREECE

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shall be obliged to follow Livy in his relation of the manœuvres of Philopœmen against Nabis in the year B.C. 192. After taking into consideration other passages of the same historian, describing the march of the Roman consul Titus Quintius, and after having perused the account of the expedition into the forest of Scotita by Philopœmen against Nabis, as it is narrated by Polybius in his 'Universal History,' we shall be enabled to determine the sites of different places, and the military positions which these authors mention.

As to the expedition of Philip of Macedon against Sparta, it is described in the notes on the taking of Thermus. Livy* tells us that Philopœmen, after having assembled his forces at Tegea, considered them in a condition to resume the offensive:—

"On entering the enemy's country he encamped the first day at Carya; and on that very day Gythium was taken. Ignorant of that event, Philopœmen advanced to the Barbosthènes, a mountain 10 miles from Lacedæmon. On the other side, Nabis, after taking possession of Gythium, set out at the head of a body of light troops, marched hastily by Lacedæmon, and seized on a place called the camp of Pyrrhus (Pyrrhi Castra), which post he did not doubt that the Achæans intended to occupy. From thence he proceeded to meet the enemy. From the length of their train, in consequence of the narrowness of the road, they (the troops of Philopœmen) spread over a space of almost 5 miles. The line was closed by the cavalry and the greatest part of the auxiliaries, because Philopœmen expected that the tyrant would attack him in the rear with his mercenary troops, in whom he placed his principal confidence. Two unforeseen circumstances at once filled him with uneasiness; one, the post at which he aimed, being preoccupied; the other, the enemy having met him in front, where, as the road lay through very uneven ground, he did not see how the battalions could advance without the support of the light troops. . . .

"On this occasion, he first ordered the army to halt; then sent forward to the van the auxiliary Cretans and the horsemen called Tarentines, each leading two spare horses; and ordering the rest of the cavalry to follow, he seized on a rock which stood over a rivulet, from which he might be supplied with water. Here he collected together all the baggage, with all the sutlers and followers of the army, placing a guard of soldiers round them; and then he fortified his camp as the nature of the place required. The pitching of the tents in such rugged and uneven ground was a difficult task. The enemy were distant not more than 500 paces. Both drew water from the same rivulet, under escort of light troops, but before any skirmish took place, as usual between men encamped so near to each other, night came on. It was evident, however, that they must unavoidably fight next day at the rivulet in support of the watering parties. Wherefore, during the night, Philopœmen concealed, in a valley remote from the view of the enemy, as great a number of targeteers as the place was capable of hiding.

"At break of day, the Cretan light infantry and the Tarentine horse began an engagement on the bank of the rivulet. . . . The enemies' watering party was also guarded by Cretan auxiliaries and Tarentine horsemen. The fight was for a considerable time doubtful, as the troops on both sides were of the same kind, and armed alike, but as the contest advanced the tyrant's auxiliaries gained an advantage, both by their superiority of numbers, and because Philopœmen had given directions to his officers, that after maintaining the contest

* Tit. Liv., lib. xxxv., cap. xxvii., &c.

for a short time they should take to flight and draw the enemy on to the place of the ambuscade. The latter, pursuing the runaways, in disorderly haste, through the valley, were most of them wounded and slain before they discovered their concealed foe. The targeteers had posted themselves in such order as far as the breadth of the valley allowed, that they easily gave a passage to their flying friends through openings in their ranks; then starting up themselves, hale, fresh, and in regular order, they briskly attacked the enemy, whose ranks were broken, who were in confusion, and were besides exhausted with fatigue and wounds. The victory was no longer doubtful: the tyrant's troops instantly turned their backs, and flying with much more precipitation than they had pursued, were driven into their camp. Great numbers were killed and taken in the pursuit, and the consternation would have spread through the camp also, had not Philopemen ordered a retreat to be sounded, for he dreaded the ground (which was rough and dangerous to advance upon without caution) more than he did the enemy. Judging both from the issue of the battle and from the disposition of the enemy's leader, in what an apprehension he then was, he (Philopemen) sent to him one of the auxiliary soldiers in the character of a deserter, to assure him positively that the Achæans had resolved to advance next day to the river Eurotas, which runs almost close to the walls (of Sparta), in order to intercept his way, or that the tyrant could have no retreat to the city when he required it, and to prevent any provisions being brought thence to the camp; and that they intended at the same time to try whether any could be prevailed on to desert his cause. Although the deserter did not gain entire credit, yet he afforded to one who was full of apprehension, a plausible pretext for leaving his camp. On the day following he (Nabis) ordered Pythagoras, with the auxiliaries and cavalry to mount guard before the ramparts, and then marching out himself with the main body of the army, as if intending to offer battle, he ordered them to return with all haste to the city.

"When Philopemen saw their army marching precipitately through a narrow and steep road, he sent all his cavalry, together with the Cretan auxiliaries, against the guard of the enemy, stationed in the front of their camp. These, seeing their adversaries approach, and perceiving that their friends had abandoned them, at first attempted to retreat within their works, but afterwards, when the whole force of the Achæans advanced in order of battle, they were seized with fear, lest, together with the camp itself, they might be taken; they resolved, therefore, to follow the body of their army, which by this time had proceeded to a considerable distance in advance. Immediately the targeteers of the Achæans assailed and plundered the camp, and the rest set out in pursuit of the enemy. The road was such that a body of men, even when undisturbed by any fear of a foe, could not, without difficulty, make its way through it. But when an attack was made on their rear, and the shouts of terror raised by the affrighted troops behind reached to the van, they threw down their arms and fled each for himself, in different directions into the woods which lay on each side of the road. In an instant of time the way was stopped up with heaps of weapons, particularly spears, which, falling mostly with their points towards the pursuers, formed a kind of palisade across the road. Philopemen ordered the auxiliaries to push forward, whenever they could, in pursuit of the enemy, who would find it a difficult matter, the horsemen particularly, to continue their flight, while he himself led away the heavy troops through more open ground to the river Eurotas. There he pitched his camp a little before sunset, and waited for the light troops which he had sent in chase of the enemy. These arrived at the first watch, and brought intelligence that Nabis, with a few attendants, had made his way into the city, and that the rest of his army, unarmed and dispersed, were straggling through all parts of the woods; whereupon he ordered them to refresh themselves, while he himself chose out a party of men, who, having come earlier

into camp, were by this time recruited both by food and a little rest; and ordering them to carry nothing but their swords, he marched them out directly, and posted them in the roads which led from two of the gates, one towards Phæræ, the other towards the Barbosthènes; for he supposed that through these the flying enemy would make their retreat. Nor was he mistaken in that opinion; for the Lacedæmonians, as long as any light remained, retreated through the centre of the woods in the most retired paths. As soon as it grew dusk and they saw lights in the enemy's camp, they kept themselves in paths concealed from view, but, having passed it by, they then thought that all was safe, and came down into the open roads, where they were intercepted by the bodies lying in wait, and there such numbers of them were killed and taken, that of the whole army scarcely a fourth part effected their escape."—(*Tit. Liv.*, lib. xxxv., ch. 27, 28, 29, 30.—Transl. by C. Edmonds, Bohn's edit.)

In order to understand the narrative of Livy, and to connect with it the data furnished by other passages of which we have treated, we must first of all determine the position of the frontier town of Caryæ, and then of the neighbouring localities, Mount Barbosthènes, Pyrrhi Castra, and lastly Phæræ; because when these points are settled, and some observations have been made on the nature of the ground where all these operations took place, we shall become enabled to understand the manœuvres and strategic movements of the ancient generals.

As respects Caryæ, we have already seen from Pausanias, that beyond the trophy of Hercules, a turning to the right of the high road from Hermæ to Sellasia and Sparta led to this town, which, as we have learned from Livy, was on the frontiers of Tegeatis and Laconia. The same author informs us, that the consul Quintius,* after reaching Caryæ from Tegea, left it for Sellasia, from which place he went and encamped opposite Sparta, on the banks of the Eurotas.

The positions of Sellasia, of the trophy of Hercules (which is three quarters of an hour to the east of the village of Arakhova), and of Tegea, being known, the site of Caryæ can be no longer doubtful, as it must lie aside, between Tegea and Sellasia, on the right of the high road, passing from Astros to the last-mentioned town and Sparta, or, in other words, half way between the trophy and Tegea. The ruins, therefore, of a tolerably large Hellenic town, situated on the left bank of the river of Vourvoura, half an hour distant from the village, towards the west, can only correspond with the remains of Caryæ, which, by its position on a river containing "water" at all seasons, was an excellent intermediate station between Tegea and Sellasia,† or rather between

* "Quintius laid entirely waste the country around Argos: then broke up his camp, crossed Mount Parthenius, and passing near Tegea, encamped on the third day at Caryæ, where he awaited the auxiliary forces of the Allies before entering the enemy's territory."—*Tit. Liv.*, lib. xxxiv., cap. 26.

† "Quintius having finished his preparations, broke up his camp and arrived on the second day at Sellasia on the Cénus, at which place, it is said, Antigonus, King of Macedonia, engaged in a great battle with Cleomenes, King of Sparta.

Tegea and the place where Antigonus fought the great battle with Cleomenes, viz., the modern khan of Krévata, at the confluence of the Enus and Gorgilos. The latter has, during the whole summer, fresh and good water, rising from a source in Mount Eva itself.

The direct road from Tegea to the Khan of Krévata, viz., to the defile formed by the Mounts Olympus and Eva, passes through the narrow precipitous pass of Klissoura. It is from nine to ten hours in length, of which at least seven are amongst mountains, without any water except at Kriovrisi, and at the Khan itself.

The road by Caryæ and Arakhova is three quarters of an hour, perhaps an hour longer; but we find here not only good ground for encampment and water at Caryæ (midway), but a route much less fatiguing, leading through shady and plentifully-watered valleys. It appears also that the ancients preferred to go by way of Caryæ. Their armies then passed through the wood of Scotita, the actual extent of which is indicated in the military plan of a part of Laconia and of Cynuria, and which at present corresponds very well with the description given by Polybius in his details of the stratagem of Philopœmen at the head of the Achaïans, assembled secretly by his orders at Tegea to act against Nabis, tyrant of Sparta.

The Achaïan general lay concealed in the forest of Scotita, between Tegea and Sparta,* in the neighbourhood of Scotita, whilst a portion of his troops were sent in advance and hid themselves near

Being informed that the ascent from thence was by a difficult and narrow road, he made a slight circuit by the mountains, and having sent in advance a party of soldiers to prepare the roads, he arrived, by a good and wide route, on the banks of the Eurotas, where that river passes almost immediately under the walls of the town."—Liv., lib. xxxiv., cap. 28.

* "Philopœmen having, by messages sent to the different Achaïan towns, assembled the troops of the league at Tegea, without having awakened the suspicion of the agents of Nabis, tyrant of Sparta, and in fact without the Achaïans themselves knowing his real intentions, put his stratagem into execution. . . .

"Having then formed his plan, he, on the very day that he awaited the Achaïans, detached a body of troops from Tegea, with orders to hide themselves during the night in the neighbourhood of Sellasia, and early on the following morning to make incursions into the territory of the Lacedæmonians. Then, when the mercenaries of Sparta had been assembled, his soldiers were to retreat *towards Scotita*, and there to await the orders of Didascalondas of Crete, to whom he had confided his plan.

"These measures being executed, he ordered the Achaïans to sup early and then to march from Tegea. Having continued his march with all speed during the whole night, he arrived at daybreak and took his position secretly in the neighbourhood of Scotita, which is situated between Tegea and Sparta.

"The Spartan mercenaries in garrison at Pellene, having been informed at daybreak by their advanced posts that the enemy were making incursions, came out immediately and made their attack with all their wonted impetuosity.

"The Achaïans retreated conformably to their orders, hotly pursued by the mercenaries, until having reached the spot where the rest of the Achaïans were in ambuscade, the Spartan mercenaries were all of a sudden surrounded, and to a man either killed or made prisoners."—Polyb., lib. xvi. cap. 21.

Sellasia, from whence, on the day following, they were to make incursions into the Lacedæmonian territory.

The last corps was, in all probability, concealed in the neighbourhood of the modern village of Vourlia, from which several roads lead to the banks of the Eurotas; and, according to the orders given to Didascalondas, the chief of this expedition, the latter drew the mercenaries into the snare laid for them by Philopœmen, viz., into an ambuscade between Sellasia and Caryæ, in the forest of Scotita.

Having thus removed the difficulties which presented themselves to Colonel Leake as regards the solution of the military questions concerning Caryæ and the forest of Scotita, we shall now pass to the details specially relating to the movements and manœuvres of Philopœmen against Nabis, on the ground comprised between Mount Barbosthènes, Pyrrhi Castra, and Sparta, and we think that the determination of the hitherto unrecognised situations of the two former localities will be the result of this examination, which will, therefore, appear not destitute of historical and geographical interest:—

Philopœmen, having advanced from Caryæ to Mount Barbosthènes, ten miles, or eighty stadia, from Lacedæmon, continued his march on Pyrrhi Castra, already occupied, unknown to him, by Nabis, who had hastened to that place from Gythium, passing close to Sparta, when the two hostile armies met on the road, evidently between Barbosthènes and Pyrrhi Castra.

Philopœmen, surprised for a moment, immediately changed the disposition of his army by strengthening his vanguard, and, after a skilful engagement, in which on the following day he gained a signal advantage over his adversary, whom he enticed into an ambuscade, he compelled the Spartan general precipitately to abandon his camp, although the retreat could only be made through a defile so dangerous and narrow “that no army, even when not harassed by an enemy, could have succeeded in effecting its passage without difficulties.”

The Achaian commander, perceiving the enemy thus disadvantageously engaged, sent his light troops in pursuit, upon which the Spartans, throwing away both arms and baggage, escaped, as well as they could, into the woods and by-ways.

Meanwhile Philopœmen, having arrived in person with the heavy troops on the banks of the Eurotas, by a road through a more open country, and having been the same evening joined by his light-armed force, detached several corps along the roads leading from Sparta to Barbosthènes and Pheræ, in order to intercept the fugitives who were returning during the night to Lacedæmon, and in the end killed or captured the greatest number of them. (*See* Livy, lib. xxxv. cap 27, &c.)

We see, by this recapitulation of the military operations, first, that Mount Barbosthenes, between Caryæ and Sparta, was eighty stadia distant from the latter capital, and that Pyrrhi Castra was a place beyond Sparta in the direction of Barbosthenes. Moreover, we see that between Barbosthenes and Pyrrhi Castra there was a dangerous and very difficult defile, and that a better road led through a more open country from Barbosthenes towards the banks of the Eurotas; and lastly, we learn that there existed two high roads, of which the one led directly from Sparta to the above-named mountain, and the other from Sparta to the town of Pheræ.

On examining the sketch which we give of that part of Laconia, there can be no doubt that the modern Mount Vresthenes, a day's march, or about 15 miles, from Caryæ, is the Mount Barbosthenes of the ancients. The distance of eighty stadia from thence to Sparta is quite exact, and etymology gives a complete support to this suggestion, Vresthenes being but an abbreviation of the ancient name of Barbosthenes.

Two roads lead from Mount Vresthenes to Sparta, one of which, being the direct route, passes near the mills of the village of Bassara, beneath the hamlet of Calivia, by Dorissa, a little to the north of Morou; the second runs by Bassara, crosses the very narrow defile of Marina, one of the most difficult in Greece, leaves the Church of 'Aghios Constantinos a little to the left, and descends from the hills of Aphisson into the plain of the Eurotas.

At a quarter of an hour's distance from the Church of St. Constantinos towards the east are the ruins of two ancient forts, now called indiscriminately *Viglia-Castri* and *Petri-Kést*, evidently contractions or corruptions, in one form or another, of *Pyrrhi Castra*, the position of which, moreover, according to Livy, could not be anywhere but here or in the neighbourhood. Indeed, as no other ancient ruins exist in the vicinity, there cannot be any doubt as to the identity of the site of Pyrrhi Castra and Petri-Kést, where are still to be found the remains of two ancient forts, at a distance of from four to five hundred yards from each other. The road from Crysapha to Aphisson passes between the two hillocks, which are crowned by fortifications. On the flanks and on the summits of these heights, as well as at the Church of Aghios Constantinos, are also to be found numerous ancient tombs.

The richly-wooded defile of Marina is, therefore, the passage which became so fatal to the army of Nabis, when retreating towards Sparta, and on the banks of the rivulet of Bassara the battle between the armies took place. A second defile, existing between the place of the combat marked in the map and of the village of Bassara, was that chosen for the ambushade laid by the Achaian general for his adversary.

The march of the heavy-armed troops, under the immediate command of Philopœmen, was effected by the direct road from Mount Vresthenes to Sparta, by way of Dorissa; and, in fact, that road runs through a far more open country, for it lies along the slopes of 'Aghios Theologos, etc.* (See Tit. Liv., lib. xxxiv., cap. 28.)

As regards the roads where Philopœmen intercepted the fugitives hastening to Sparta, we have already sufficiently described the roads of the Barbo-thenes, and it only remains to be added that the ruins of the ancient Pheræ have been found by the author half an hour distant to the N.N.E. of Verria, the name of which clearly proves it to have succeeded to the town mentioned by Livy.†

We see at Pheræ, amongst other ruins less worthy of note, those of an Hellenic temple, but they are in little better preservation than those of Scotita and Thornax.

The road from Bassara to Verria displays numerous traces of ancient chariot-wheels, some of which are very long and deep.

The high-road from Sparta to Pheræ, according to the formation of the ground, passed by Aphisson and the defile of Marina, and near the villages of Bassara and Verria.

(The remainder of the paper is occupied with critical notes upon the observations of the Chevalier de Folard on the battle at Sellasia between the forces of Antigonos and Cleomenes.)

* The road from Vresthenes to Sparta is joined near the mills of Bassara by a road running from the Khan of Krevata along the banks of the Œnus. It was by this road that the Consul Quintius descended to the banks of the Eurotas, when from the spot, "where it is said that Antipater, King of Macedonia, gave battle to Cleomenes, tyrant of Sparta," he the Consul made "a slight circuit" in the mountains in order to march on the Eurotas by a good road.

In reality, as Livy observes, the ascent from the camp of Quintius towards Sellasia, by the common road, running along the foot of the modern Paleogoula (see the Map), is rough in many places.

† Βερίσια. The Βερίσια of Macedonia seems to have been the same as Φίραϊ, which name was carried in the ancient Peloponnesian form into Macedonia by the Argolic colony. Some of the Peloponnesians were partial to the letter B in the room of an initial aspirate, as in the instances of Βοιτυλός, Βοιωτία, for Οἰτυλός, Οἰωτή. Verria therefore seems to have preserved its present form from Pelasgic times.

II.—*On the Geography of Burma and its Tributary States, in illustration of a New Map of those Regions.* By Captain HENRY YULE, F.R.G.S., Bengal Engineers, and Secretary to Major Phayre, late Envoy to the Court of Ava. With Map.

Communicated by Sir RODERICK I. MURCHISON.

Read, January 26, 1857.

SECTION I.—*Geography of Burma and Pegu.*

THE mission of Colonel Symes in 1795 first gave shape to the geography of Burma.

The celebrated geographer D'Anville had so little real acquaintance with these regions as to consider it probable that the Aracan river and other tidal channels of that coast were branches thrown off by the Irawadi, ignorant, it would appear, of the intervention of the great Yoma range, which must have been well known to European mariners for two centuries. A greater geographer than D'Anville might have taught him better, had he consulted Ptolemy.* He made the old confusion too, which seems somehow to be inherent in the nature of things, between the Pegu river, the Sitang, and the Salwen.† And misled by, or misapprehending, an old Dutch MS. chart of the Irawadi which he greatly prized, he carried the city of Ava more than three degrees too far to the north.‡

A survey of the general course of the Irawadi from Negrais to Kyouk Myoung was made by Captain George Baker (of whose accuracy Rennell expresses a high opinion), when he went ambassador to Alompra in 1756. A copy of this, and of another more detailed chart from a Dutch source supplied by Major Rennell, will be found in Dalrymple's *Oriental Repertory*.

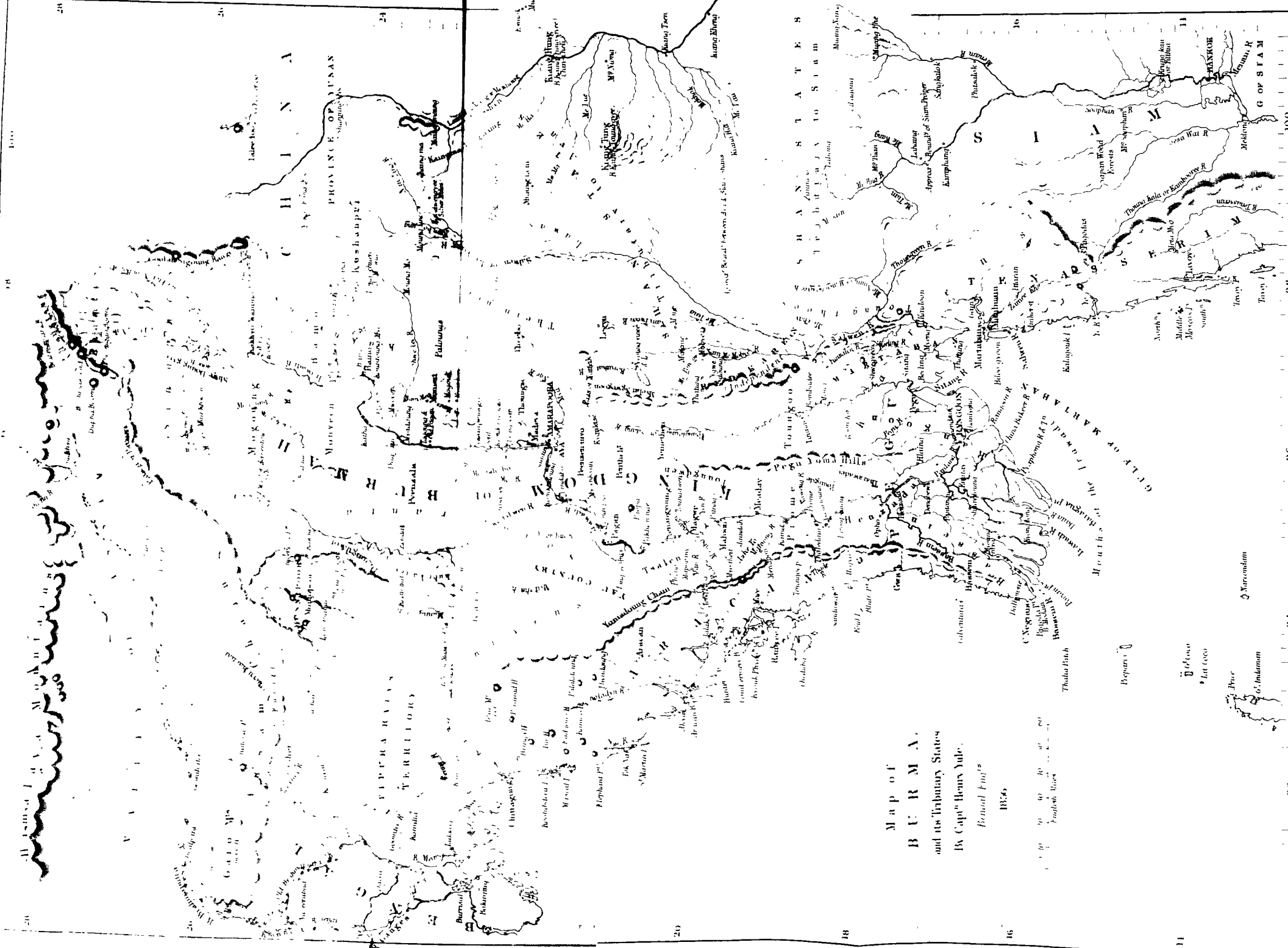
Rennell himself, however, fell into errors in regard to the geography of these countries. He supposed the Lookiang of China to be the upper course of the Irawadi,§ and the river of Aracan, which is in reality a mountain stream of no great length, he con-

* The Yoma is without doubt the Maeandrus of Ptolemy.

† A confusion which even Mrs. Somerville does not seem wholly to have escaped. See 'Physical Geography,' Ed. 1849, i. 394.

‡ See 'D'Anville's *Eclaircissements Géographiques sur la Carte de l'Inde*,' p. 144. The map itself I cannot find in Calcutta. There is a map of Southern Asia, however, in the large 'Universal Atlas,' published in 1795, which seems to be taken from D'Anville in this part. The Dutch chart was evidently not far wrong in the form of the river, but has been by some blunder shoved bodily up from 3' to 4°; Digan (Rangoon) being placed in 19° 30', instead of 16° 47', Proise in 22° 30', instead of 18° 48', and Ava as mentioned in the text.

§ *Memoir of Map of Hind.* p. 296.



Map of
BURMA
and its Tributary States
By Capt. Henry Yule.

British Empire
1856
Scale 1:1,000,000
English Miles

jectured to be the debouchement of the Kenpoo, one of the Tibetan rivers in the maps of Duhalde.*

Symes had the good fortune to be accompanied on his mission by an excellent practical surveyor, Colonel Wood of the Bengal Engineers (then an Ensign), and by a great geographer, Dr. Francis Buchanan. Wood produced the first good survey of the Irawadi to Ava, and Buchanan, by the diligence and sagacity with which he taught travelled Burmese to record their information in rude but valuable maps, filled the utter blanks which had hitherto existed throughout the interior of the country; and fixed even such remote places as Bamó and Mogoung with no contemptible approach to accuracy. His materials were made use of by Dalrymple in the small map accompanying Symes's narrative, but they were not published by himself, or in full, till many years afterwards.†

No further advance was made in Burmese geography till the war of 1824-26. This added little to our knowledge of Burma proper, so much were operations confined to the river banks. But two of the passes between the Irawadi and the sea were traversed and mapped, and an army of surveyors was thrown upon the northern frontier; Bedford, Wilcox, Bedingfield and others on Assam and its borders; Grant and Pemberton in Munnipúr. The western sources of the Irawadi were reached by Wilcox; much information was obtained concerning the course of the Kyendwen, and its lower valley was surveyed by Lieut. Mountmorency in 1828.

In the succeeding years, after our establishment at Maulmain, during Mr. Blundell's tenure of the Commissionership there, and Colonel Burney's residence at Ava, knowledge continued to accumulate. Dr. Richardson commenced a series of arduous journeys to the Shan States with the view of encouraging trade to Maulmain. In 1829, he reached Laboung in the immediate vicinity of Zimmé. In 1834, and again in 1835, he repeated his journey by different routes and reached that town, the Jangonai of the old writers, unvisited by any European traveller for two centuries.‡ In 1837, he for the third time visited Zimmé and proceeded northward through the Shan Tsaubwashes of Mokmé, Moné, and Nyoung-yuwé to Ava.§ In the same year Captain Macleod penetrated through Zimmé to the remote Shan State of Kiang Hung on the

* Ed. Phil. Journal, iii. 38. The Kenpoo is probably the eastern branch which joins the T'sanpoo before issuing into Assam as the Dihong.

† Under his changed name of Hamilton in the 'Edinburgh Philosophical Journal,' vols. ii., iii., iv., v., vi., vii., and x., and in 'Brewster's Edinburgh Journal of Science,' vols. i., ii., iii., and iv.

Buchanan's Journal during the Mission has never, I believe, been published in full.

‡ Journ. As. Soc. Bengal, v. 601, 688.

§ Abstract in J. A. S. B., vi., 1005. MS. Journal in Foreign Office, Calcutta.

Cambodia river, and nearly on the borders of China.* In 1830, Captain Pemberton was allowed to proceed by the Kyendwen and Irawadi from the Munnipúr frontier to Ava, and from Ava to Aracan by the Aeng pass. In 1831, Dr. Richardson then at Ava with Colonel Burney had the opportunity of visiting part of Burma Proper previously unexplored, being permitted to travel from Ava through the districts of Moutshobo and Dibayen to Kendat on the Munnipúr frontier.† In 1833, Captain Macleod also proceeded to Kendat, but the journey was made by water. He produced a revised survey of the lower course and mouths of the Kyenwen.‡ In the end of 1835, Singpho outrages on the Assam frontier induced the Government to call for the interference of the Burmese, and Colonel Burney was enabled to depute the commandant of his escort, Captain Hannay, to accompany the Burmese Governor of Mogoung to the north. Captain Hannay, first in modern times, ascended to Bamó, and thence to Mogoung and the Amber mines of Hookhong, bringing back much interesting information.§ Again in the next year Dr. Bayfield, the Resident's Assistant, was sent on a somewhat similar mission. He reached the summit of the Assam boundary chain, and was met there by Dr. Griffith, the able botanist, who returned with him to Ava. || The revolution, which ended in Tharawadee's successful usurpation, broke out in their absence, but they reached the capital in safety and just in time to quit it with Colonel Burney. Our intercourse with Burma ceased, and an end was put for many years to the accumulation of geographical knowledge in this direction.

The annexation of Pegu and Martaban, and the surveys which have ensued, enable us to establish a firmer nucleus for the exacter aggregation of materials; but it must be said that little addition to our knowledge beyond our own provinces has yet been made. Of large tracts we have still no accurate description. Such are the eastern part of Burma proper from the Irawadi to the Shan States, though on this Major Allan has collected a good deal of native information; the Yau country, west of the mouth of the Kyendwen; the interior of the Doab between the Irawadi and Kyendwen from Moutshobo upwards; and the whole of the hill country east and north-east of the capital, towards the ruby-mines and the Chinese frontier ¶

* Abstract in J. A. S. B., vi., 989. MS. Journal in F. O., Calcutta.

† J. A. S. B., ii. 59.

‡ MS. Journal in F. O., Calcutta. Map in Pemberton's lithographed Route-maps, 1836.

§ MS. Journal in F. O., Calcutta, and abstract thereof in J. A. S. B., vi., 247.

|| Bayfield's MS. Journal in Surveyor-General's Office, Calcutta; and Griffith's Posthumous Papers, Calcutta, 1847.

¶ A good deal of jealousy was excited among the Chinese authorities by Captain Hannay's visit to the upper Irawadi, and it was made the subject

The map published by Captain Pemberton, at Calcutta, in 1838, was a great advance upon any that had preceded it. It added an extraordinary amount of new matter to the public stock of geographical knowledge, combining as it did all the information collected by himself and the other officers mentioned above, during the ten years succeeding the first war. But to have executed such a work thoroughly well on the scale adopted and over so vast a field would have required greatly more labour than could be afforded by an Indian official with other duties.

The following have been the chief steps in the construction of the map now submitted to inspection:—The British province of Pegu is taken from a large map by Lieutenant Williams of the Bengal Engineers, which has just been submitted to the Government of India. The Map is a provisional one, the survey being incomplete as yet. Martaban is from a map by Mr. Hobday, lately published at the Government Lithographic Press at Calcutta. The course of the Irawadi from the British frontier to Amara-púra is from a large chart constructed from the survey of Captain Rennie and Lieutenant Heathcote during the voyage of Major Phayre's mission in 1855.

The country from Ava upwards to Mogoung, the Yú mines, and valley of Hookhong, is from the route surveys of Colonel Hannay and Dr. Bayfield; the former being taken from a reduction on the scale of 32 miles to the inch given in the 6th volume of the *Journal of the Asiatic Society of Bengal*; and the latter from a map on a scale of eight miles to an inch in the Surveyor General's Office, Calcutta. The lower part of this section, from Ava to Malé and Tsanpenago, is chiefly from a sketch by Mr. Oldham (Geological Surveyor of India). There is a large discrepancy in the latitude of Malé, Mr. Oldham's farthest point as assigned by him, and by the two preceding surveyors. As far as Kyouk-myoun, Mr. Oldham's sketch is undoubtedly to be preferred. Kyouk-myoun is well known to be the port of Moutshobo on the

remonstrance at the end of a letter received in 1836 from the royal elder brother Taukwang, Emperor of China, "who assisted by the Sagya Nat (Indra: the Burmese version of the Chinese Teen), rules over a multitude of Umbrella-wearing chiefs in the great Eastern Empire;" by "his royal, younger brother, sun-descended king, lord of the golden palace, who rules over a multitude of Umbrella-wearing chiefs in the great Western Empire." The letter of which Colonel Burney obtained a translation concluded thus:—

"Everything that occurs in elder brother's Empire shall be made known to younger brother. With respect to younger brother's Empire, it is not proper to allow the English, after they have made war and peace has been settled, to remain in the city. *They are as a forest that like the Popul tree (i. e. to spread and take such hold that they cannot be eradicated).* Let not younger brother therefore allow the English to remain in his country, and if anything happens, elder brother will attack, take, and give."

Colonel Burney considered that this paragraph was undoubtedly an interpolation by the authorities in Yunnan. —In a letter to Pol. Department, 16th September, 1836.

Irawadi, and to be only 14 miles distant from that place. Again, the position of Moutshobo and its distance from Ava are pretty nearly fixed. Now, so inconsistent with these data was the position of Kyouk-myong assigned in the surveys of the two older travellers, that Pemberton in his map has actually introduced a second Kyouk-myong, which has no real existence, in the proper relation to Moutshobo.* On this as well as on personal grounds I should have altogether preferred Mr. Oldham's authority as far as it carried me. But on the other hand, the latitudes assigned by Hannay and Bayfield (who both used the sextant) are in very tolerable agreement, not only at Malé but all the way up to Mogoung, and I have not therefore felt at liberty to throw over their authority, so I have given the latitude of Malé somewhat lower than theirs indeed, but considerably higher than Mr. Oldham's.

In Burma Proper below Ava, the interior towns and districts have been filled up from a very valuable map, compiled by Major Grant Allan of the Madras army, from the collation of numerous native routes and from other information.

The divisions of districts above Ava I have, to a small extent, laid down, from information given in Bayfield's MS. Journal. A few other particulars of mountain chains, &c. in upper Burma have been deduced from the same journal, and from that of Colonel Hannay.

The part of China which appears in the Map is from D'Anville's map of Yunan after the Jesuits. I have, however, been compelled to shift the longitude of the whole $0^{\circ} 7'$ to the west, as, after establishing Bamó as far east as was admissible from the authorities, the distance from Bamó to Long-chuen or Mowun, the first town in the Chinese territories, was greater than could be allowed on consideration of two independent Burmese routes between those two places, given by Burney in the Journal of the Asiatic Soc. And I have also advanced the Burmese frontier nearer to Long-chuen for reasons founded on the same itineraries. The frontier of China has also been thrown back so as to exclude the states of Kaingma, Mainleng-gyee, and Kiang-Hung, all of which are embraced within the Yunan frontier in D'Anville's Map. From a Map by Klaproth in his Essay on the Brahmaputra and Irawadi, and from routes given by Bayfield, a few additional names of interest in this part of Yunan have been obtained. I have also had before me Berghaus's map of *Hinter-Indien* published in 1832, a careful and beautiful work, but destroyed by the wholesale adoption of Klaproth's preposterous deduction of all the rivers of Burma from the remote mountains of Tibet.

For the eastern Shan States the following course has been

* There are several of these duplicates in Pemberton.

adopted. Kiang-Hung is laid down in the Jesuit Map under the name of Tcheli-chuen-fou-se.* The longitude therefore I have taken from that Map with alteration to the westward mentioned above. The latitude was determined by Macleod to be $21^{\circ} 58'$. This location fixes Kiang-Hung $0^{\circ} 19'$ farther east than Macleod's estimate, according to which it was laid down in the Map of the Shan country, compiled under the superintendence of Dr. Richardson from Macleod's routes and his own, and which was embodied in Pemberton's Map. In that Map, however, the Salwen river, say at its confluence with the Thoungyeen on our Tenasserim frontier, was $0^{\circ} 7'$ further to the west than it ought to have been according to Hobday's surveys. To obtain the skeleton of the Shan country, I therefore took as a base a line drawn from Kiang-Hung (determined in the manner just explained) as the eastern extremity, to the confluence of the Salwen and the Thoungyeen (determined by Mr. Hobday) as the western extremity; and to this base as compared with the line joining the same points in Richardson's map, I have adjusted the positions of Zimmé, Kiang-Hai, Kiang-Tung, Laboung, Lagong, Moné, &c., but preserving the latitudes in all cases, as I believe that Richardson, as well as Macleod, took observations for latitude. The position of Kiang-Tsen on the Mekhong I have thrown considerably higher than that laid down from information by Macleod. This was necessary for the sake of agreement with the route of Duhalde's Chinese traveller† which is, in all other respects, so accurate as to be entitled to rule this point. The positions of Mainlenggyee, of Kiang-ma, of Maing-maing, and of Muang-la, the frontier town of Kiang-Hung beyond the Mekhong, have been taken from D'Anville, where these towns appear under the names of Monglien, Kemma, Moung-Moung and Mongla, applying the general correction of longitude.

The true position of the towns east of Ava—Thoungzé, Theebo, Thein-nee, Toungbain, Momeit, is very uncertain. In laying them down approximately, I have considered Richardson's information as recorded in his journal; his (presumed) additional information as embodied in his map; a detailed route of the road to China through Thoungzé, Theebo, Teein-nee, and Kaingma, given by Colonel Burney;‡ and Buchanan's native Maps in the early volumes of the Edinburgh Philosophical Journal. The course of the Myit-ngé is from Mr. Oldham's sketch as far as

* I was led to this identification by Captain Macleod's incidental mention in his MS. Journal that the Chinese name of the city was Cheli. Since this Memoir was written, I have been informed by Captain now Colonel Macleod, whom I had the pleasure of meeting on my way from India, that he had taken much pains about the year 1840 in compiling a map of these regions, which was submitted to Government. Of this I had not been able to find any trace in Calcutta.

† See the next Section.

‡ Journal of the Asiatic Soc. of Bengal, vi. 424.

goes, and the rest from Richardson. But the latter part is, I fancy, on very little authority.

The Kyendwen, from Kendat to its confluence with the Irawadi, is laid down from Captain Macleod's survey; the latitude and longitude of Sunyachil Ghat opposite Kendat being taken from Pemberton in his Report on the Eastern frontier, and those of the confluence from our Mission Survey. This gives the river a good deal more of easting in its southerly course than previous maps exhibited, owing to a circumstance to be presently mentioned.

The Aracan mountains, &c. between lat. 19° and $20^{\circ} 12'$ are taken from a map of the Aracan frontier which I compiled in 1853, embracing my own route surveys through the Yomadoung passes in February and March of that year.

The remainder of the map has been taken from public sources.

It must be understood that scarcely any of the mountain masses represented in this map are known in any detail, and some of them are only known in a general way to exist, with a strong probability that their direction is so and so. In such circumstances might not some of the old ways of representing mountains be preferable to our modern methods? either by a simple broad brown shade, as in the copies of ancient maps printed with the oldest editions of Ptolemy, or by a mass of little pictorial papillæ, as in the maps of the seventeenth and eighteenth centuries.

In the graduation of the map, the longitude of Calcutta has been assumed as $88^{\circ} 19'$. A correction of $-0^{\circ} 2'$ has been applied to Pemberton, Williams, &c. to adapt them to this basis.

I have alluded above to the transfer eastward of the line of the Irawadi. This I believe to be an important advance in the truth of our delineation, and its necessity I pointed out some years ago. In a memorandum, dated July, 1853, attached to the Aracan frontier map referred to above, it was stated that great difficulty had been experienced in combining the materials. This difficulty, it was observed, had principally arisen from what I had no doubt was an error in the relative longitudes assigned in existing maps to the Aracan coast and to the line of the Irawadi, by which the intermediate space was unduly narrowed. I showed that there was not nearly room enough to introduce in their proper proportions the various surveys that had been made of the transverse passes from the Irawadi to the sea, and that the adaptation of these surveys to the limits of the published maps involved an amount of mutilation sufficient to scare Procrustes himself. The memorandum proceeded:

"The maps of the Aeng road afford us an example of the mutilation that has been practised. From Maphé Myo at the eastern base of the mountains to Memboo on the Irawadi, a pretty straight and level road, Captain Pemberton's route table

gives three marches, amounting in all to 38 miles, and the distance on a straight line measured on his accompanying route map is 30 miles. Yet the same Captain Pemberton, at the same time, published an elaborate map of the whole Eastern frontier, and there we find this same distance from Maphé to Memboo laid down as 10 miles, instead of 30, because the assigned longitude could not afford more. And so it remains on the latest published maps.

"That is what has happened when an attempt has been made to construct a combined map of the two regions, the sea-coast and the Irawadi valley. Quite as curious an indication of something wrong may be seen in the maps in which no such combination is attempted. Take Wood's survey of the Irawadi. There you will see the mountains carried parallel to the river at what appeared to that officer a proper distance westward, and the consequence is that the southern part of Aracan is suppressed altogether, hustled into the sea in fact. On the other hand look at Fytche's drawing of the Sandoway Province. He carries the ridge of the Yoma boldly up to the 95th meridian, or nearly so, that he may have a proper quantity of room for his own district, leaving, in consequence, no space at all between the ridge and the Burmese river." "I believe then it will be found that the whole line of the Irawadi requires shifting eastward," etc. All that has since been done has tended to prove the justice of this anticipation. Prome was found to be laid down in existing maps with a longitude varying from 95° to $95^{\circ} 54'$, and the highest figure that I could anywhere find assigned to it* was $95^{\circ} 10' 38''$. By Lieutenant Williams's survey the longitude now assigned to Prome is $95^{\circ} 18' 15''$.

Again, in Pemberton's Table the Longitude assigned to Pagán is $94^{\circ} 34' 10''$, whilst Rennie and Heathcote's survey now gives it $94^{\circ} 56' 26''$. In neither case has the survey yet been completed with sufficient accuracy to put these new assignments, especially the latter, beyond question. But they are undoubtedly much nearer the truth than anything that we possessed before, and as an example of the result, it will be found that in the present map the distance of Memboo from Maphé is 25 miles, instead of being compressed to 10 as in Pemberton.

Till the end of the thirteenth century the seat of the Burmese monarchy was Pagán on the Irawadi, about 100 miles below the present capital, where the remains of many hundred temples, some of great size and grandeur of design, appear to indicate a higher art and perhaps a higher civilization than now exists in

* Table appended to Pemberton's Report in Appendix 19. In the index to Black's atlas indeed, Prome is put down as $95^{\circ} 19'$, but this is evidently an accident.

Burma. The Pagán kingdom in its largest development appears to have temporarily ruled over Pegu Martaban and Tavoy,* whilst towards China it extended over that western part of Yunan which is still chiefly occupied by the Shan race.† After the fall of Pagán the kingdom seems to have past into a state of division and decay, and when the monarchy was established at Ava about the end of the fourteenth century its limits were much narrower than they had been in the palmy days of the Pagán kings.

About the year 1500, when these regions first became known to Europe, the region of which we speak appears to have been divided into numerous kingdoms and principalities. Ava was confined to the middle valley of the Irawadi. Aracan and Pegu were independent monarchies, as was also Toungoo occupying a tract of uncertain limits on the north-east of what is now our province of Pegu. Beyond this was the state of Kiang-mai or Zimmé (Jangomai), and the states of Laos. In the middle of the sixteenth century two great warriors were in succession princes of Toungoo. They first conquered Pegu, and then annexed all the adjoining regions, till the second of these princes, Tshenbyoo-myayen, or "The Lord of many White Elephants," the chief much spoken of by Ferdinand Pinto, under the name of the *Chaumigrem*, had, according to Master Cæsar Frederick, one of the old travellers in Purchas, six-and-twenty crowned kings at his command. To this epoch are referable all the old traditions of the magnificence of the Pegu monarchy.

This vast empire fell as rapidly as it had risen, and Ava rose again upon its ruins in the beginning of the 17th century. Pegu snatched a brief independence, and still briefer supremacy (1740-1752), but was again, and finally, subdued in the latter year by the Huntsman Alompra, the founder of the present dynasty of Ava.

The modern kingdom did not, however, attain its greatest development till 1822. As happened with the Nepalese and some other Indian powers, the empire of the Burmese princes had just expanded to the widest limits known in their history, when it came in contact with the British bayonets, and a rapid collapse ensued. Thirty years have sufficed to strip them of dominions which had been the gradual acquisition of two centuries. 1824 saw the weak great grandson of Alompra ruling over a territory that extended from the frontiers of the old British district of Rungpúr, to the great river of Cambodia eastward, and to the island of Junk-Ceylon

* Mason's Nat. Productions of Burma, pp. 373, 454.

† Barley in J. A. S. vi. 122, 124. This territory was lost to the Pagán empire about A. D. 1300. It was conquered again by Tshenbyoo-myayen in 1562, but apparently fell to China on the decline of the empire under his son.

southward, embracing altogether an extreme width of 800 miles and extreme length of 1200 miles, and a seaboard of extent equal to the length. At this period, though the wealth of the Burmese monarchy was probably less than that of the great Peguan empire of the sixteenth century, its limits were considerably greater, including, within the conquered circle, the whole valley of Assam, Kachár, Munnipúr, and Aracan; regions which had never been subject to Pegu.

1854 saw the Burmese confines reduced nearly as low as they had been in the period of decay which succeeded the fall of the Pagán dynasties, and without access to the sea except through many leagues of British territory.

The kings of Ava are said to consider as territory properly belonging to the Empire, whatever was subjected to the authority of five of their most renowned predecessors. These five are Nauratha-menzau the forty-second king of Pagán, and the founder of the Shwé-zeegoong pagoda there in the eleventh century; Mengyee-tsauké the second king of Ava; Tshen-hyo-myayen the great king of Pegu and conqueror of Ava in 1554; Nyoungyan-mentará the restorer of Ava on the fall of the Peguan empire in 1601; and Alompra.*

Seven tribes are recognised by the Burmese as of the Myamma stock; viz. the Rakain or people of Aracan; the proper Burma; the Talain; the Khyen of the Aracan mountains; the Karen of the forests of lower Burma, Pegu and Tenasserim; the Yau; and the Tavoyer.† There are traces however in the Burmese history of even the proper Burma having been amalgamated from various tribes.‡ The country of the proper Burma is the middle region of the Irawadi and its tributaries from about Lat. $23\frac{1}{2}^{\circ}$ to Lat. $18\frac{1}{2}^{\circ}$. To this definition must be added the upper valley of the Poun-loung or Sitang; a river, which many of our maps since Buchanan's time have represented as communicating with the Irawadi, and even with the Salwen, far from the sea by strange anastomoses. These are undoubtedly imaginary. High mountains form a barrier between the Salwen and the Sitang, and hills of less altitude but equal impermeability between the Sitang and the Irawadi. The two latter do send out inosculating branches in the lower part of their course; or at least the expansive Delta of the greater river with its intersecting channels spreads to the shores of the wide funnel up which drives the furious bore of the Sitang.§

The Burman territories as they were in 1852 might be divided

* MS. Letter to Govt. from the Resident at Ava, dated 5th July, 1832.

† Judson's Dictionary.

‡ See *ant.*, in *u t.*

§ This great disproportionate funnel-mouth probably led to the old confusion of the Sitang with the Salwen. It was thought the big mouth must belong to a big river.

conveniently, but not with any great precision, into four parts. 1st, *Northern Burma*, including a variety of sparse and alien populations, Singphos, Shans, and what not, under more or less imperfect subjection. 2nd, *Burma proper*, inhabited by pure Burmans only, or by the descendants of foreign captives. 3rd, *Pegu*, whether taken as the Delta of the Irawadi, or as the Burman vice-royalty of Henzawadee, or as the original Talain kingdom. Taken as the British Province now bearing the name, it extends to Lat. 19° 27', and considerably beyond the largest of the former definitions. 4th, the *Eastern Shan tributary states*, extending in longitude from the mountains of the Red Karens to the Cambodia river.

The last possess a certain independence of jurisdiction, having more and more of the reality as they recede from the shadow of the Golden Palace.

The gorge, through which the waters of the sacred Brahmaputra burst out from the Brahmakúnd into the valley of Assam, is formed by the convergence of two great mountain chains, which fence that valley from west to east.

The northern chain, the Himalya, stretching far beyond Assam, bounds that valley, as it bounds all India, with its awful barrier of unchanging snow. The southern, a chain of far less altitude and celebrity, and of no one name, is co-extensive with the valley which it limits and defines, and may conveniently be termed the Assam chain, as it has been, I believe, in some Atlases.

Rising suddenly from the plains of eastern Bengal as from a sea, and about 220 miles N.E. of Calcutta, the last-named chain stretches eastward in a broadening chaos of woody spurs and ridges, with grassy undulating table-lands, taking successively the names of the races which inhabit it, Garoos, Kasias, and Nagas of many tribes: ever increasing in the elevation of its highest points, from 3000 and 4000 feet among the Garoos, to 6000 among the Kasias, 8000 and 9000 in the region north of Munnipúr, till, sweeping north-eastward in a wide mass of mountain of which the general direction only is known, it emerges to knowledge again as the Pat-koe, traversed by the Burman armies in their A-samese inroads. Further on, abreast of the Brahmakúnd, it rises to a height of 12,000 and 14,000 feet, and then, coming in contact with the spurs of the waning Himalyas, it lifts itself into the region of eternal snow, and stretching still eastward, embraces its northern rival and forms that amphitheatre of snowy peaks, glorious doubtless, but unseen as yet by European eye, in which the Brahmaputra has its earliest springs.

This lofty prolongation of the southern chain, known now as the Langtang, sends down from the snows of its southern face the head-

waters of the Irawadi. Beyond the eastern sources of the river it strikes southward a great meridian chain, snow-capt in some places like the parent ridge, and forming from old time the bounding wall of China to the westward. It is called by the Singpho tribes, which cluster round the roots of all these mountains of northern Burma, the Gulansigoung, and its offshoots stretch with a variety of breaks and ramifications of which we know nothing precisely, but ever tending southward, between the Irawadi and the Selwen, till one of its great spurs almost reaches the sea near Martaban, where it parts the Salwen from the big-mouthed Sitang. Nearly abreast of Toungu and 170 miles north of Martaban, this chain is known to attain an elevation of 8000 feet.

The snowy range of Langtang projects its shorter spurs between the branches of the Irawadi, and this side the westerly branch, it sends down an offshoot called the Shwé-doung-gyee, separating the Irawadi from the springs of the Kyendwen.

Still further westward in the Naga country, between longitude 93° and 95° , a great multiple mass of mountains starts southwards from the Assam chain. Enclosing first the level alluvial valley of Munnipoor at a height of 2500 feet above the sea,* it then spreads out westward to Tipura and the coast of Chittagong and northern Aracan, a broad succession of unexplored and forest-covered spurs, inhabited by a vast variety of wild tribes of Indo-Chinese kindred, known as Kookees, Nagas, Khyens, and by many more specific names. Contracting to a more defined chain, or to us more defined because we know it better, this meridian range still passes southward under the name of the Aracan Yoma-doung, till 700 miles from its origin in the Naga wilds it sinks in the sea hard by Negrais, its last bluff crowned by the golden Pagoda of Modain, gleaming far to sea-ward, a Burmese Sunium. Fancy might trace the submarine prolongation of the range in the dotted line of the Preparis, the Cocos, the Andamans, the Nicobars, till it emerges again to traverse Sumatra and the vast chain of the Javanic isles.†

Between these two great meridian ranges that have been indicated, the one eastward of the Irawadi and the Sitang, the other westward of the Kyendwen and the Irawadi, lie what have been characterised above as the first three divisions of the Burman territory, and these before the detachment of Pegu might have

* It is curious that the water-parting between Kachar and Burma, between the tributaries of the Brahmaputra and of the Irawadi (eventually), appears to lie in the plain of Munnipûr.

† Is it certain that the geological formation of the Preparis and other islands in the Bay of Bengal corresponds with the Yoma-doung range? It is quite certain that that of "the vast chain of the Javanic isles" does not, for it is wholly volcanic.—J. C.

been considered as forming the kingdom of Burma. The tract enclosed by these ranges is not to be conceived as a plain like the vast levels that stretch from the base of the Himalyas. It is rather a varied surface of rolling upland, interspersed with alluvial basins and sudden ridges of hill.

The Burman is himself nowhere a dweller in the mountains, though thus girt round with a noble mountain barrier. With such a frontier, with neighbours who only wished to be let alone, with such a trunk line from end to end of his dominions as the Irawadi, with his teak forests, his mineral riches, his fisheries, his wheat, cotton and rice lands, a world of eager traders to the eastward, and the sea open in front, the king of Ava's dominion was a choice one, had not incurable folly and arrogance deprived him of his best advantages, cast down the barriers of his kingdom, and brought British cantonments and custom-houses within his borders.

The river recognised throughout its course by the Burmans as the Irawadi, comes from the snowy peaks which separate the valleys inhabited by the Shan race of Khamtis, from the head waters of the sacred Brahmaputra, in lat. 28°.* For nearly 200 miles below this the Burmese know little of it. In their forays into the Khamti country they never took the river line, and they care not to meddle much with Singphos and savage Kakhyens who line the mountain ranges on both banks. It receives a branch of size equal to itself from the eastward in about lat. 26°,† then emerges into the familiar acquaintance of the Burmese at the mouth of the Mogoung river (in 24° 56'). Here the united stream turns off in its route to the so-called city of that name, once the head of a flourishing Shan principality, of which manuscript histories exist professing to commence from the 80th year of our era.‡ It is now a poor village in the centre of a damp, unhealthy, and dreary plain, scantily cultivated by the remnants of the Shan population. Mogoung gives name to a Woon-ship (or district)

* The Khamtis have no communication with the Lamas to the north, but the Khunongs who occupy the hills at the very sources of the Irawadi have intercourse with both. (Wilcox in *As. Res.* XVII.) The Burmese have no knowledge even of the existence of their Tibetan co-religionists, though there are such within 50 miles of their nominal boundary. But so effectual is the separation of a high mountain frontier, with its accessory of savage demizens.

† This branch, which has never been seen by any European, appears to be the only channel which can possibly connect the Irawadi with a remote Tibetan source. But that it does not exceed in size the usual branch rising in the mountains above Khamti, indeed that it is somewhat inferior to the latter, all the native evidence collected by Wilcox and Hannay strongly affirms.

‡ Pemberton, p. 108. This author had very erroneous ideas of Mogoung, which he calls "a wealthy city." It had not been visited by any European when his Report was published. The era mentioned in the text may be the Hindu one of Shrivana or Samvatsara, which in one part of Southern India corresponds with A.D. 78, and in another A.D. 74.

which nominally includes the whole breadth of Burma to the Assam hills, and is the residence of the governor of these northern tracts when he comes from court to exact such revenue as they will yield.

The Mogoung river is tortuous and subdivided, with occasional rapids: but boats of some considerable size ascend it, and several of its branches above Mogoung are navigable by canoes. One of its most considerable tributaries, the Endau-Khyoung,* has its source in the Endaugyee, a lake among the hills, to which the traditions of the people assign a volcanic origin.

The greater part of this region is a howling wilderness, exhibiting levels of winter swamp and low jungle intermingled with low hills and sometimes with belts of noble trees; the higher mountain range of the Shwe-doung-gyee (4000 feet), running down on the eastward and screening off the Irawadi from the head-waters of the Kyen-dwen. In the seclusion of its valleys Kakhyen villages are said to be numerous, but few or no habitations are seen in the open country north of Mogoung, till you reach the comparatively peopled valley of Hookhong or Payendwen, the site of the amber mines, 70 miles from Mogoung.† Even this plain does not show a population of more than 10 to the square mile. It is the most northerly locality in which the Burmans venture to exercise authority. With the Singphos they rarely or ever meddle, but they have sometimes enforced their claims on the remote Shans of Khamti. Passes lead from the Hookhong plain into Khamti over the shoulders of the Shwe-doung-gyee, a distance of 16 days' journey, and also direct towards China through the district east of the Irawadi called Kakhyo-Wainmo. By this route the Lapae Singphos came to purchase amber. Those, living on the Chinese frontier, have adopted a good deal of the Chinese dress and habits, and are by far the most numerous and civilised tribe of their nation. From this valley also the path traversed by Dr. Griffith in 1837 leads over the Pat-koe range to Suddiya in Upper Assam. The distance from Mainkhwon to the summit of the range, which is crossed at a height of 5600 feet, is 11 stiff marches (130 to 140 miles), the greater part through dense jungle or up the boulder beds of rivers. Eleven more, but somewhat shorter stages (121 miles), bring the traveller to Suddiya. The path does not appear to be practicable for elephants. Other passes are said to cross the range a little further to the westward.

The amber-mines lie on the south side of the valley of Hookhong in lat. 26° 20'. The amber is found with small masses of lignite (which form the clue in seeking for it), in a dark carbon-

* *Khyoung* or *Hkyoung*, a river or watercourse.

† But said to be extended to upwards of 100, by the windings of the road.

aceous earth covered with red clay. It is extracted from square pits, reaching sometimes to a depth of 40 feet, and so narrow that the workmen ascend and descend by placing their feet in holes made in two sides of the pit, no sheeting being used. In 1837 only about a dozen people found employment at these mines.*

Hookhong or Payendwen produces salt, gold, and ivory, in addition to amber. It was formerly occupied by the Shans, but they fled from Burman oppression, and the inhabitants are now chiefly Singphos with their Assamese slaves. The villages generally consist of 10 or 12 of the long barrack-like houses of the Singphos, crowded together without order, and almost without interval, within a bamboo stockade; the exterior of which for further defence is surrounded with small bamboo spikes stuck obliquely in the ground, a favourite defensive device among all these nations.

The Kyendwen rises in the Shwe-doung-gyee north of Mogoung and thence passing northward, north-westward, and westward, through the plain of Payendwen, is already a broad and navigable stream. After leaving the plain, it curves round to the south and keeps its southern course till terminating in the Irawadi.

Descending from the mouth of the Mogoung Khyoung, the Irawadi, already a majestic river several hundred yards wide, soon contracts suddenly to 100 yards, and squeezes itself for 30 miles through the rocky defile called the Kyouk-dwen, sometimes narrowing to 30 yards and deepening as it narrows. In the floods the stream is a boiling cataract throughout the gorge. Sparse and small villages are to be seen here and there in the defile, where Shans and another peaceful race called Pwons cultivate their vegetables, sugarcane, and tobacco. These also have their tradition of extinct principalities and Burman despoilment. Kakhyens, a name given to the wilder tribes of Singphos† by the Burmese, keep the hills, whence they swoop down on their natural prey the Shan villagers, in their ferocious raids, respecting neither age nor sex; but they spare the Pwons, with whom they live on friendly terms.‡

At one point in the Kyoukdwen, where the river contracts to the utmost, the scene is described by Hannay as very striking. The rocks are brilliantly coloured, green, yellow, brown, and shining jet black, and the strata are in an extraordinary degree twisted

* Griffith's Posthumous Papers, p. 128.

† Singpho is merely the word for *man* in the language of these tribes. The great nursery of the Singphos, Kakhyens or Kakoos (as the wilder tribes are called by their congeners, Kakhyen being the Burmese appellation), is along the Sgin-mae Kha, or great eastern branch of the Irawadi. (Colonel Hannay.)

‡ Dr. Bayfield describes the Kakhyens of the hills west of Mogoung as wearing a blue cotton dress with red stripes, and thick straight hair cut clean off level with the eyebrows; very dirty and drunken.

and inconformable, having exactly the appearance of having been poured out half melted from a furnace. In places the banks descend precipitously into the water, and the depth is immense. Dr. Bayfield states that at several spots he found no bottom with a 25 fathom line.* In these narrows the river, in the rainy season, rises at least 50 feet, probably more.

Emerging from the defile, the Irawadi expands again to its half mile or more,—casts up sandy shoals and encircles peopled islands. It takes in from the eastward, some 150 yards wide and navigable for canoes, the Taping river into which Klaproth strove by dint of Chinese learning to cram all the waters of the Tsanpoo. It then straggles among sands in front of Bamó, an emporium thronged with cotton bales and bundles of silk, with pale Chinamen, black-jacketed Shans, and all the trafficking tribes of those obscure regions.

Bamó is the *entrepôt* of the overland trade between China and Amarapura; and from November to May is the terminus of arrival for innumerable strings of mules, bullocks, and ponies on the one side, bringing the silk and “notions” of China, and of large flat-bottomed boats on the other, bringing the Burmese cotton, which forms the staple export in this trade. Without here entering into details on the subject of this trade, I may state that from particular inquiry I was led to estimate the whole value of imports and exports by this route (exclusive of the amber and yu of the northern districts) at about 425,000*l.* Of this the cotton export amounted to 225,000*l.* and the silk import to 120,000*l.*

At the old Shan city of Man-mo or Bamó on the banks of the Taping river, in 1837, there were said to be the remains of an old brick godown, or warehouse, of which the people did not know the history.† It is possible that this may be a relic of the old British factory which Dalrymple conjectured to have been at Bamó.‡

A few miles below, we pass Koun-toung-myo where the last invading Chinese army was discomfited (1769). Whilst commencing to curve westward and northwestward in a great double flexure (repeated in a less pronounced form below Amarapura), the river is drawn again between two rocky and precipitous fences, constituting the second Kyoukdwen.

Away to the eastward from Bamó and Kountoun, hills are visible peopled by cateran Kakhyens, and by breeches-wearing Paloungs peaceably growing tea for pickling.§ Beyond these hills

* And in one place (so he told Dr. Griffith, but has not mentioned it in his journal) with a 40 fathom line.

† Bayfield's MS. Journal.

‡ See ‘Dalrymple's Oriental Repertory.’

§ The *Illo-pi-t*, or “Wet Tea,” which, made up with oil, salt, assafoetida, &c., into a sort of pickle, is essential to the comfort of a Burman, and is partaken of

are other and other ranges, amid which the Chinese Emperor has his guard-houses, and the country is all mapped as part of Yunnan. But the towns are chiefly occupied by Shans, and their native Tsaubwas are maintained with some show of authority under the Chinese government. Five days journey eastward from Bamó is the Chinese frontier line, and one day further the frontier city of Mowun, or Long-chuen-foo.

As the river recovers from its great contortion, and turns again southward, we pass Kathá, once the boundary between Ava and the Shan States to the north.* What villages there are lie on the west; on the other side is an unhealthy tract of swamp and jungle till you reach the Shwé-lee, a tributary of considerable length flowing in from near Momien or Teng-ye-choo. Some 30 or 40 miles up from the Irawadi the Shwé-lee receives a stream draining the valley of Momeit, within the jurisdiction of which are the ruby mines of Kyat-pen and Mo-gout. Nearer, on the northern bank, stands Mweyen, once Mauroya, said to have been the earliest seat of those kings of the Indian Sakya race, from whom the monarchs of Tagoung and Pagán claimed descent.†

The Shwé-lee is variously described as from 300 to 600 yards wide at the mouth, but full of shoals and not discharging a great amount of water.

A little below the Shwé-lee, on each side of the Irawadi, at Myadoung on the east and at Thigyain on the west, there are the remains of old stone forts. That at Thigyain is said to have been in ancient times the capital of the Kadós, a tribe now scattered over the interior of the Monyeen district and that of Pyenzala, west of the river.‡ Teak abounds in the hills (of no great height) west of the river, all along this tract.

Not much further down are the ancient ramparts of Tagoung, regarded as one of the most ancient seats of the Burmese kings, and dating from the days of Gautama himself. Close by it lie the ruins of the upper and more ancient Pagán, believed to have been the capital from the first to the ninth century, when it gave place to the better-known city of the same name a hundred miles below Ava. Thirty miles further bring us to Malé and Tsanpenago. Here the river once more contracts into a defile, constituting the third and last Kyouk-dwen, and continuing for more than 20 miles. The strait is, however, not nearly so marked or decided as those

on all ceremonial occasions. It is floated to Ava on bamboo rafts, so as to remain always partially wet.

* Burney. Sometimes, however, this boundary was as low as Tsanpenago.

† Burney in *J. A. S. B.* v. 162.

‡ A private note from Colonel Hannay speaks of the Kadós as being the most interesting of the northern tribes, "like the Yüs, one of the old old Burmese races, and similar in type to what we see of the Bhurs and Raj Bhurs of the present day, a race known by tradition as the oldest of Indian races."

higher up the river. Nearly opposite, the head of the defile draws in from the eastward, commencing with the bold peak of Shwé-oodoung,* that great mass of mountains which runs parallel to the river as far as Amarapura, and then continues its course to the south, marking the separation between Burma and the Shan States. And not far above the lower limit of the defile is Kyouk-myoung, visited a century ago by Captain Baker when he went as envoy to the fierce conqueror, Alompra, at Moutshobo, and where king Tharawadee attempted to establish his capital after his brother's deposition in 1837.

Below the defile, the valley of Ava may be considered to commence. It lies entirely on the east side of the Irawadi, the range of hills which terminates at Sagain, opposite Ava, hemming the river closely in on the west. The length of the valley from Tseen-goo at the mouth of the defile to the high land south of Ava is about 60 miles, and the greatest breadth of plain is about 16 miles, just abreast of Amarapura. All this basin is, I should think, capable of rich cultivation. It is not, however, all cultivated, nor is the population, except within two or three miles round the capital, what one would expect in a fertile soil and the heart of an empire.

At the lower end of the valley and immediately under the walls of Ava comes in the fine stream of the Myit-ngé, from the unvisited regions of the northern Shans. Amarapura, the present capital, stands six miles N.E. of Ava, on a sort of peninsula between a creek or inundation channel of the Irawadi and a chain of lakes. The walled city stands four square to the points of the compass, with the palace in the centre, but the chief seat of population and trade is in the suburbs west of the walls. Just above Ava the great river contracts from a mile and more in width to about 800 yards, in passing between the rocky roots of the Sagain hills and an isolated temple-crowned eminence on the left bank, and then deflects with a grand sweep suddenly to the westward, washing on either hand the walls of Ava and Sagain. This westward course is continued for 40 miles, through a richly-wooded and cultivated alluvial plain of no great width, bounded by more barren rolling ground of little elevation, till the river draws near the Kyendwen, when it bends again to the south, taking in that chief tributary at as fine an angle as that of a railway junction. The extreme outlets of the Kyendwen are 22 miles apart, the interval forming a succession of long, low, and partially-populated islands.

The lowest and largest mouth of the Kyendwen is traditionally said to have been an artificial cut made by one of the kings of Pagán, and which had been choked up for many centuries till a

* 6000 feet in height according to Mr. Oldham's estimate.

flood opened it out in 1824. It does not certainly appear to be represented in Wood's survey.

Of the middle course of the Kyendwen, between the valley of the amber mines, in lat. $26^{\circ} 30'$, and the Burmese post of Kendat, which has several times been visited by our officers both from Munnipúr and Ava, little is known. The Burmese, I believe, scarcely exercise any jurisdiction over the inhabitants, who are chiefly Shans along the river, the Kakhyens and other wild tribes keeping to the hills. The navigation is interrupted at several places by falls or transverse reefs, a series of which is known to exist some 16 miles below the plain of Hookhong, and another, which first bars the traffic upwards, at Kaksa or Kat-tha, four days' journey north of the head of the Kubó valley in latitude $24^{\circ} 47'$. Not far below this last it receives a large tributary, the Orù, near the sources of which, in a long narrow valley, are the *Yu* stone mines which bring the Chinese traders to Mogoung.* The lower part of the Ooroo valley is said to be well peopled and cultivated. The serpentine trade all travels eastward; but salt also is produced from brine springs in the valley, and timber is floated down for sale along the Kyendwen. Below the Ooroo the narrow alluvial valley of the Kyendwen is also tolerably peopled, and affords occasional rice grounds fertilised by annual inundation.

West of the river, between the parallels of $22^{\circ} 30'$ and $24^{\circ} 30'$, stretches from north to south the valley of Kubó.† This valley, the northern part of which was long a bone of contention between Ava and Munnipúr, was in 1833 made over to the former by the authority of the British Government, at the instance of Colonel Burney, compensation being made to Munnipúr. It is a long strip not more than 10 to 15 miles in greatest width, separated from the Kyendwen by a range of uninhabited and forest-covered hills under Ungoching. The valley itself is, with the exception of sparse clearances for cultivation, a mass of forest abounding in varnish and wood-oil trees, and in valuable timber, saul and teak, which, however, is not available for want of water-carriage; and though its inhabitants are remarkably hardy, it is notorious for jungle fever most fatal to strangers. The northern portion of the valley, called by the Burmese Thounghwot, by the Kathés (or Munnipúrees) Sumjok, and the southern, called Kalé, are still under the rule of the native Shan Tsaubwas tributary to Ava, the only princes of this class who have maintained their position under

* This is the green, translucent, and very hard mineral called by Mr. Crawford "noble Serpentine." It is largely purchased by the Chinese for exportation to their own country, where it fetches an extravagant price, and is manufactured into cups, bracelets, &c. It is found in the form of boulders imbedded in a yellow clay.

† Kubo is the name applied to the Shans in the Munnipúr language.

the Burmese Government on this side of the Irawadi. The central portion, Khumbat, is under a Burmese Governor. Kalé is much the most populous part of the valley, and it has an exit for its teak by the Narenjara or Munnipúr river which passes through it into the Kyendwen. It also produces rice and cotton, with wax and ivory. Kalé is one of the sites in which Burman history or legend places the dynasty of ancient Hindoo immigrants into their country. The classic name of the Kubó valley is *Mauríya*. The hills on the west of Kalé are occupied by the Khyens, a race extending southward throughout the long range of the Yomadoung to the latitude of Prome.*

The Kyendwen is navigable for the largest boats of the Irawadi up to Kendat, and the trade is very considerable in grain from the lower part of the river, as well as to some extent from the valley of the Ooroo. Teak also abounds in many places along the coast of the Kyendwen, and numerous rafts are floated down. The last miles of its course are through a broad, populous, and fertile champaign, and presented to us in passing up the great river an almost continuous horizon of palmyra groves, always in Burma a sign of population and culture. From these there is a considerable manufacture of palm sugar. Strange to say, the sugar-cane appears to be generally used by the Burmese only in the same way that it is used by elephants. A little sugar is, however, made from the cane near Ava. Most of the Kyendwen's tributaries from the east are auriferous; and hence perhaps the name of *Sonaparanta* applied anciently to the country between the two rivers and near their junction; not improbably the Aurea Regio of Ptolemy, which is, I believe, almost a translation of the Sanscrit name.

This Doab is nearly bisected from north to south, for a distance of probably two degrees, by the Moo, a river entering the Irawadi among thick foliage and numerous villages a little below Kyouktaloung. The lands on its banks are well peopled and cultivated, at least for some miles beyond Dibayen, which gives its name to the district. Near the Moo are several small communities of native Christians, believed to be descended from captives brought up from Syriam by Alompra in 1756. They are under the superintendence of a small body of Piedmontese priests.† The upper course of the Moo has never been visited, but there are several *Myos*, or towns, known to exist near it. The true Burman population probably

* Colonel Hannay identifies the Khyens with the Nagas of the Assam Mountains. They must also be closely allied to the Kookees. In Trant's account of the Khyens on the Aeng pass, he mentions their worship of a divinity called *Passine*, and Lieutenant Stewart, in his notice of the "new Kookees" of northern Kachar, says that they recognize one all-powerful God as the author of the universe, whom they term "Puthen." (Trant's 'Two Years in Ava,' and Journal of the Asiatic Soc. of Bengal, 1855, p. 628.)

† See p. 164.

does not extend much beyond Myédu. Of the surface we only know that it is traversed by several belts of hill, the general direction of which is from north to south. East of Dibayen and 14 miles from the Irawadi is the city of Moutshobo. It has not, I believe, been described by any European since Dr. Richardson was there in 1831. It then exhibited a walled area which he calls two miles square, with a shrunken town of 1000 houses. Myedú, north of this, is said to be the chief seat of the *Ehabats*, or *Kachárees*, who furnish a select part of the Burman cavalry.

From above the junction of the Kyendwen to the vicinity of Maloon, the Irawadi spreads itself over a channel reaching sometimes to a width of four or five miles, and embracing numerous alluvial islands. Below the point named it is restricted between steep defined banks, rising often into hills, and does not again expand considerably till it has passed Prome.* It is navigated up to the capital by boats drawing 3 feet of water at all seasons, and it is believed that a channel of 4 feet 6 inches could always be obtained, though not without examination.

Of the Yo or Yau country, lying along the river of that name between the barren Tangyee hills that line the Irawadi opposite Pagán, and the base of the Aracan Yomadoung, nothing more is known, I am sorry to say, than was recorded long ago by Dr. Buchanan. The people are believed to be of the same race with the Burmese, but from their secluded position speak the language in a peculiar dialect. There are paths from the Yau country into the Kalodán valley in Aracan, which king Tharawadi made some talk of rendering passable for troops, when he was breathing war in 1839. They must traverse the country of some of the wildest tribes of the Yoma, and nothing of them is known. The Yaus are great traders, and are the chief pedlars and carriers of northern Burma.

South of the Yaus comes the district of Tsalen, a rich alluvial between the skirts of the Yomadoung and the river, and considered one of the most productive districts of the empire. Through this leads the road which crosses the celebrated Aeng pass, over the Yomadoung, at a maximum height of about 4600 feet, the merits of which as a military route have been grievously over-estimated. On the Burmese side it winds for many miles in the channel of a torrent, the Mán Khyounge : on that of Aracan its excessive steepness and want of drainage have in many places cut it into the semblance of a rugged ravine. Yet it does in more favourable parts preserve the aspect of a made road, which it really was, having been executed by the Burmese about the year 1816 to facilitate communication with their then subject province of Aracan.

* See ante.

No skill or judgment, however, had been originally employed in laying it out. It was, in all probability, only the immemorial track widened out.

Another road, also partly artificial, leads from P'haing, or Phying, a town in the Burmese plain some 20 miles north of Map'hé-myo, where the Aeng road enters the hills, across one of the highest parts of the Yomadoung to the Aracanese village of Talak. It is now much disused and was always difficult. An unsuccessful attempt was made to ascend it by a part of General Morison's force in 1825. Other parts south of the Aeng pass lead from the Burmese stations of Padeng and Myo-theit to Aeng, from Taindah near our frontier, and from Men-doon, which is within our territory, to Aeng, and to Maee on one of the tidal channels opposite Ramree. Further south still are several passes more or less frequented leading to the coast, and over the general course of that of Toungoo, which debouches in the Irawadi at Thalédain below Prome, where a military road is under construction by Lieutenant Forlong. Another pass leads from near the rocky promontory of Akouktoung, 25 miles below Prome, direct to Sandoway by the large hill village of Alegyo, and several more still further south as the ridge of the Yoma sinks to its termination in the sea, in front of the projected city of Dalhousie.

The height of the main ridge crossed by these passes, at least from that of Talak on the north to that of Alegyo on the south, varies from 4600 down to about 3200 feet: and the route distance from plain to plain is generally from 50 to 60 miles. There are two descriptions of path among these passes. In the one, the road adopts the bed of a stream as its guide and axis, winding along its margin, constantly crossing and recrossing, or throwing up the boulders of its channel. In the other, the road attaches itself to the ridge of one of the long spurs, rising and falling as the ridge does, and sometimes with great alternations of height, until the main ridge is attained and crossed, generally at one of its highest points. The supply of water is sometimes seriously defective in these passes, especially on the Burmese side, where in the hot months the aridity is excessive and the whole forest casts its foliage.* From the ridge-paths on either side of the hills the traveller has frequently to go a long way down the hill-side to fill the bamboo that serves him as a pitcher. Generally on the ridge above the spring there is a grassy spot denuded of forest by

* "A singular contrast is presented by the appearance of the two sides of the mountains during the season of my journey (March and April). On the Aracan side verdure still prevails; the forests are thickly clothed and hide the soil. Towards Burma all is desiccation and death; the hills are like hills of ashes, and the forest a collection of dry dead sticks; scarcely a leaf is visible in this scene of 'torrid winter.'" ('Report on Aracan Passes,' 1853.)

the frequentation of ages, where travellers rest and cook their meals, almost the only such grassy spaces existing in the mountains. Such halting-places are termed *Tsá-hán* (Eat-Rest).

Tribes under a great variety of names, and in every stage from semi-civilisation to deep barbarism, inhabit the broadest part of this great western mountain boundary of Burma. The most extensively diffused of these, extending from lat. 28° perhaps to the Assam frontier, is the race of the Khyens, noted for the singular manner in which their women cover their whole faces with tattooed lines. Their houses, raised on long bamboo stilts, are clustered on the steep slopes of secluded valleys. They follow the practice called *jhoom* cultivation in eastern Bengal, clearing the hills of forest or bamboo, burning the clearance, and then dibbling in, even on slopes where footing is hard to find, their crops of mountain rice with a little cotton and sesame. When the neighbouring ground has all been laid under crop they move in search of new seats and new cultivation.

South of the Tsalén district, the country west of the Irawadi becomes more hilly and wild. In fact the Yomadoun, from the point crossed by the Padeng road, 16 miles south of the Aeng pass, throws out a great parallel spur to the southward, known in the districts as the *Ashé Yo* or Eastern Ridge. The valley between these two ridges is the source of the fine river Matoong, which flows past the town of Mendoon, and enters the Irawadi in our territory just above the town of Kama. The valleys are cultivated with rice, tobacco, onions, and pepper, for the three last of which the district has some celebrity among the Burmans. The land is irrigated from the deep-bedded streams by large bamboo wheels of nearly 40 feet in diameter, which the running water, slightly dammed for the purpose, both drives and feeds. This practice is found also on the Kyendwen, and among the Eastern Shan states.

On the east bank of the Irawadi from Ava to our frontier there are few places of importance. Myeengyan, on a low plain opposite the little Delta of the Kyendwen, is at present one of the largest provincial towns in Burma. It is a great mart for rice, both from the adjoining districts and from Pegu, and exhibited more of business and bustle than any other town which we saw in Burma. The population is probably 8000 or 10,000. Nyoungoo and Pagán-myo, 3 miles apart, are both embraced in the space, thickly spotted with the ruined temples of the ancient Burmese capital, Pagán. They are the chief seat in Burma proper of the manufacture of the cups and boxes made of varnished basketwork, commonly called lackered ware. The temples of Pagán extend over a space of probably 16 square miles. Some of them are of great size and grandeur of design, and appear to indicate a higher

art, and perhaps a higher civilization than now exists in Burma. Yenangyoung is noted as the depôt of petroleum which is found in its vicinity, and which is extensively used for burning, and for many minor uses, all over the country. It is now also exported from Rangoon to England. The oil is drawn from shafts varying from 80 to 300 feet in depth, according to their locality in the valleys or on the barren tabular hills. The quantity annually extracted appears to amount to about 25,000,000 of pounds. Magwe is the last town of any consideration on the east of the Irawadi above our frontier. Its probable population is nearly equal to that of Myeengyan.

Of the interior of the country, from Ava to Meaday, I have before said that little is known except the names and general positions of the district towns, and the routes which Major Allan has compiled. This tract, apart from the march of our little army in 1826, which hugged the river bank, has never been traversed by any intelligent European. The impression of voyagers ascending the river, from what they see in the ascent of such heights as are within reach, is (and it is an irresistible impression) that the whole interior of the country is a regular waste of dry rolling hills dotted with thorn bushes and euphorbias. This may be true in considerable measure of the districts of Magwé, Yenangyoung, and Pagán, but that it is erroneous as a general description there can be no manner of doubt. The tributaries which enter the Irawadi on this side are not many of them perennial, at least in the lower part of their course, but in the rains they carry large bodies of water, which are diverted and utilised in raising crops of rice and cotton over the valleys, which are sometimes extensive. Of such a productive character is the country round Toung-dwen, watered by the Karen-Khyoung and the Yen-kyoung, two of the largest tributaries from the east side, and to which cart-roads lead from Patnago, Magwé, and Yenangyoung. Villages are numerous in the plain around Toung-dwen (9) in number according to the favourite Burmese formula), and of these one is said to contain 700 houses, and four others from 300 to 450. Toung-dwen itself is surrounded by a brick wall, and boasts a few old cannon *

Between the district of Toung-dwen and that of Yéméthen east of it, extends from north to south the dividing range of hills which separates the Sitang Valley and the Irawadi from near Pegu upwards. These hills are called "*Yoma*" by Major Allan. The name, signifying "Great Bone," spinal ridge or chief watershed in fact, is one admitting of general application, but it having become extensively known (even among continental geographers) as a proper name applied to the far more prominent Aracan range, it is

* MS. Report by Major Allan.

only confusing to apply it absolutely to these hills. The ranges might perhaps be termed respectively the Aracan Yoma and the Peguan Yoma.* The latter appears to die away nearly abreast of Yéméthen; at least the hills are not of sufficient altitude to form any obstacle to the passage of cart-roads, which exist between that town, and both Pagán and Yandabo on the Irawadi.

The district of Yéméthen is said to contain a considerable amount of population, and of cultivation in wheat, cotton, and rice. The town itself is considered by the Burmese a place of much importance. It is surrounded by a dilapidated wall, and does not contain more than 400 houses.

Beyond Yéméthen eastward come the mountainous regions inhabited by the Red Karens, tribes of whom are to be found up to about this latitude between Burmah proper and the Shan states. The mountains are a part of the extensive system which has been described above as bounding Burma on the east, extending from the snowy sources of the Irawadi to Martaban, and the bold outline of which is seen from the capital stretching away to the southward. Forty miles south-east of Ava Dr. Richardson descended from these mountains by the Natteik pass, which he speaks of as the longest and most laborious in the Burmese dominions, or that is known to exist in any of the neighbouring countries—expressions reminding us of Marco Polo's account of the long descent which led from China into Mien or Burma. Richardson does not mention the elevation of the pass, but another branch of the chain which he had passed a little to the eastward is marked in his route-sketch as 4131 feet above the sea.

The districts of Pen-the-le, and Peenzen-myo are well spoken of; and Kyouk-tsé and the other districts immediately south and south-west of Ava, stretching to the foot of the Shan mountains, are better supplied with artificial irrigation (from the small rivers which join the Myit-nga before its discharge into the Irawadi) than any other part of Burma, and are consequently well peopled and productive.

The part of this fertile tract immediately southwest of Ava is known as Le-dwen-ko-Karain, or "the Nine Districts in the fields." The wheat of Ava is principally grown, I believe, in this neighbourhood. It is used by the Mahomedan population for food, but its employment by the proper Burmese is almost confined to confectionery.

The Peguan Yoma, it has been said before, dies away, or becomes insignificant, a little above the latitude of Yéméthen. From this it stretches south, with a general direction in the meridian, to

* The name of Galladzet Hills, given to this range in Wood's map, does not appear to be recognized, and probably arose from some mistake.

a parallel a little higher than that of the head of the delta. Here it attains a height of 1500 feet, its highest elevation, just before forking out into several long low terminal spurs.* Two of these spurs enclose the valley of the small river of Pegu. The extremity of another is the eminence which has been carved into the terraced base, from which the golden bulk of Shwé Dagón has for two thousand years †

“Shot upwards, like a pyramid of fire”

athwart the dismal flats of the delta.

Considering their moderate elevation, the slopes of this range are steep and difficult, and in the central part the range spreads in a wide wilderness of rugged hills covered with impenetrable jungle, and practically barring all intercourse between the two valleys of the province. The whole range to the frontier is wooded, and the remains of the chief teak forests of Pegu are found in the recesses of these hills, as well as many virgin groves of that noble timber, protected by their inaccessibility.

In the more northern part of the range, where the hills are lower and the jungle is deciduous, some of the tracks between the two valleys are said to be passable for Burmese carts. In the dry season water is scarce in all that tract, except on the banks of the Irawadi and its largest affluents, and is found only in pools dug in the bed of stony rivulets. Towards the frontier also the water when scanty is often brackish, sufficiently so in many cases to induce the Burmese to boil it down for salt.‡ On the banks of the streams, rice is grown, and in the hill-clearings, hill-rice, cotton, millet, and sesamun. These hills, throughout their extent, constitute the water-parting between the Sitang and the Irawadi.

The Irawadi continues to flow between bold and wooded banks to Prome; and the whole breadth of the land thus far is more or less rugged. Below Prome the valley expands into an alluvial plain, intersected on both sides by low ridges covered in the rains with the densest foliage, but in the dry season exhibiting a brick-dust soil beset with leafless stems. Twenty-five miles below Prome, where the cliffs of Akouk-toung protrude into the Irawadi, this level is on the western bank interrupted for a brief space. On the other side it unites with the fertile plain of Pongdé, which stretches from the isolated Prome hills to the foot of the Peguan-Yoma; and passing southward continues to widen till lost in the vast plains of the delta.

* MS. Report on Survey of Pegu, by Lieutenant Williams.

† The height of Shwé Dagón above the platform is 521 feet; above the ground level 487 feet. The height of the great Shwé Madau at Pegu is 334 feet above the platform.

‡ Major Allan.

The delta may be considered to commence at the bifurcation of the Bassein branch from the main stream, a little above Henzada. That branch, though affording the best and deepest access for ships into the heart of the delta, is now entirely cut off from the main stream during the dry season by a bank of sand which fills the head of the channel to a height of many feet above the surface of the river. In the rains, steamers drawing 10 feet water pass without difficulty. The harbour of Rangoon is connected with the Irawadi, by the channel called Panlang. This is not navigable by the steam flotilla in the dry weather, and at that season the vessels are obliged to make a detour, analogous to that forced on steamers bound from Calcutta for the upper Ganges, though of much less extent. They then ascend by the channel called by seamen China Bukeer, which is the shortest outlet of the Irawadi, though another, which keeps more the direction of the unbroken stream, retains the name. There is, however, no one of the ramifications which can claim to be the primary mouth.

A vast labyrinth of creeks and channels cuts up the lower part of the delta into an infinity of islands. Within the full tidal influence, these are lined with mangrove thicket; further up with forest of a nobler kind, or more commonly with a fringe of gigantic grasses. Scattered along the channels and sheets of water, where fish are plentiful, are small clearances where the inhabitants devote themselves to the preparation of *ngapee*,* and to the manufacture of salt. But a very small part of these Soonderbuns is under cultivation. And even further from the sea vast tracts of fertile soil remain in a state of nature or abandonment. The most cultivated and populous tracts are found along the Bassein river; north of Henzada; and in the plain of Pong-dé.

The breadth of the whole province, between the meridian chains which limit it, is at the latitude of the frontier about 140 miles; and of the central portion from the Irawadi to the Sitang 73 miles.

The Sitang river, known in the upper part of its course as the Pounloun, is shown even in some of the latest maps as discharging from the lake of Nyoung-yuwé in the westernmost of the southern Shan states; from which also a radiation of other streams was represented as diverging to the Myitngé, near Ava; to the Irawadi, near Yénangyoung; and to the Salwen, with a great variety of junction lines between these ramifications.† The

* The paste of mashed and pickled fish, resembling very rank shrimp-paste, which is the favourite condiment of the Indo-Chinese races. It is the *blackang* of the Malays. Putrescent fish, in some shape or other, is a characteristic article of diet among all these races from the mountains of Sylhet to the isles of the Archipelago.

† These features originated in the Burmese maps obtained by Dr. Buchanan.

sole real discharge of the lake of Nyoungyuwé is through one of the Red Karen valleys into the Salwen, and the true source of the Pounloun was ascertained by Dr. Richardson to be in the hills south-east of Ava, about 25 miles north of Nyoungyuwé.

The whole extent of the Sitang valley is about 350 miles, of which one-half lies within the British provinces of Pegu and Martaban. The valley above the frontier has not been visited. Below that line the banks are high and hilly nearly to Toungoo, when the hills recede and an alluvial tract commences, which extends with varying width to the sea, large tracts being inclosed in reuniting loops of the river. As the river descends, the plains on the west side widen, but are covered with a dense thicket of jungle and thorny bamboo, giving place near the estuary to a dreary expanse of elephant grass. The ancient royal road from Pegu to Toungoo is still to be traced over this wild plain. On the eastern side the plain is of more uniform width, but narrower, and gives place suddenly to the mountain ridges which divide the Sitang from the Salwen,—the termination of the great meridian chain which limits Burma on the east.

Population and culture are very sparse and scanty over the whole valley. A secluded Burman tribe called Yebain have their hamlets in the wild nooks of the dividing range, where they occupy themselves in rearing the silkworm. In the upper part of the valley, the forest trees are of a larger and finer character than in the corresponding latitude on the Irawadi, and they do not appear to be subject to that denudation of foliage which gives the western valley an aspect of such desolation in the months of March and April.

The course of the Sitang is tortuous throughout the province, but especially for 50 miles north of the cantonment of Shwégýeen. It writhes like a wounded snake, so that the development of the stream would nearly double the actual length of the valley.* Throughout its course it is shallow and full of shoals, over which boats of any size have to be dragged laboriously in passing between Shwégýeen and Toungoo in the dry season. The lower part of the river presents a still greater obstacle to navigation in the remarkable bore, occasioned by the union of two portions of the tidal wave of the Indian Ocean, which drives up the narrowing funnel of the estuary with a speed, it has been stated, of nearly

The divergence and intercommunication of rivers appears to be a favourite feature in Barmese notions of geography, perhaps derived from the myth of the great northern lake, the supposed source of all the great rivers of India. Buchanan himself seems to have been so far misled by these notions as to conjecture a partial communication of supply, by such an offshoot, from the Tsanpoo to the Irawadi, whilst admitting in the main Rennell's theory of the discharge of the latter river by the Brahmaputra.

* Lieutenant Williams.

12 miles an hour, and with a crest raised sometimes 9 feet above the surface. Native boats do frequently make the dangerous entry, but it has never been accomplished by our steamers, though it has been attempted. The important frontier station of Toungoo is thus, by the wild nature of the country on the one hand, and by the wilder water-access on the other, deprived of all easy and effective communication with Rangoon, the centre of government, of supply, and of reinforcement. And this has led to the project of a canal from the Pegu river to the Sitang, at a point above the dangers of the bore. A natural channel does exist, through which the spring-tides of the Sitang reach the Pegu river. But examination seems to have proved that this channel can be turned to no efficient account for the object in view.

The Burman population was considered in former days, I believe, to extend down to Taroup-mau or Chinese Point, about 32 miles below Prome, so called from having been the point Turn-again of the Chinese army which captured Pagan and overran Burma in the end of the thirteenth century. But the majority of the population of Pegu have long been either Burman or Burmannized, and the genuine Talains or Móns, retaining their ancient speech, are confined to the south and east of the delta, and to the provinces of Martaban and Tenasserim. I find very little satisfactory information regarding the Talains. My friend Colonel Durand, during his administration of Tenasserim, induced the late Captain Latter to pay attention to the language and to commence the compilation of a dictionary; but it is not known how far the intention was carried out.

The most interesting race in southern Burma is that of the Karens;—among the Burmese, but not of them, scattered up and down through all the wildest and most secluded parts of Pegu and Martaban as well as Tenasserim, and the western parts of Siam. There are, at least, two tribes of these known in these provinces. One tribe call themselves Shos, but are called by the other tribe *Puos*, and by the Burmese Meet-khyeens, or Talain Karens. The other tribe call themselves Sgaus, but by the Burmese are designated Meethos, or Burman Karens.* Their tongues, though dialects of a common language, and such that a knowledge of one greatly facilitates the acquisition of the other, are sufficiently distinct to be mutually unintelligible. Remarkable fragments of Scriptural tradition have been ascribed to the Sgaus, and doubtless existed among them, but with strong respect and sympathy for the missionaries, I must say that they seem to me to have accepted these too readily as genuine primeval tradition, without sufficient inquiry into their possible derivation. Another singular tradi-

* Mason's Nat. Productions of Burma, p. 477.

tion among them, reminding us of that which the Spanish conqueror found amongst the Mexicans, was a longing expectation of white kinsmen from the seaward, who were to bring them deliverance from Burman serfdom, and instruction in the law of God.

The white kinsmen have indeed come from the seaward, but some say that the Karens have found their little finger heavier than the loins of their old masters. I made particular inquiries from the missionaries on this point, and I am glad to say that the idea was scouted by these worthy men. It may well be, indeed, that in many a corner of a country just beginning to be ruled by such a mere handful of strangers, the Burman local officers still exercise much of their old oppression. But the missionaries, who alone know the Karens, for they alone know the language of their two tribes, warmly and indignantly denied that the people looked on the change of rulers as other than a liberation and a blessing.

The most considerable population of Karens appears to be in the Bassein district, where they form the great bulk of the agricultural population, the Burmese and Talains being principally small traders, fishermen, and mechanics. After the cession of Aracan to us they spread largely over the hills into the district of Sandoway. In the northern parts of Pegu, on the side of the Iravadi, the Karens are very sparse and few, and I have not heard of them further north in Burma than the district of Tsalen.*

The circumstance which has thrown so much of interest round all that appertains to the Karens is the extraordinary success of Christian missions among them during the last twenty-five years, a success attended by the gratifying fact that the 134 native evangelists who minister among their countrymen are not exoticised dependants on foreign bounty, but live among their people and are supported by them. During last year the Karen congregations of the Rangoon district alone contributed for missions among their countrymen Rs. 600, besides Rs. 2000 for the High School at Kemendain, near Rangoon, and Rs. 2887 towards the erection of a brick church there.† The languages of both tribes

* A theory propagated by Mr. Kincaid, an American missionary, that the Kakhyens of Upper Burma are Karens, I believe to have been put forth on insufficient and probably inaccurate grounds. There seems to be no doubt that the Kakhyens or Kakos are Singphos, and no good reason has been stated for considering the Karens to be very closely allied to the Singphos.

† Calcutta Christian Intelligencer, 1856, p. 53. When the American Society lately resolved to withdraw almost entirely their support from schools among this people (a measure very adverse to the views of the missionaries themselves), four or five of the most respected converts voluntarily went into trade in Rangoon, a thing alien and unknown to all the former habits of the race, in order to devote half their earnings to the support of schools. This they have faithfully done, and in about two years contributed something like Rs. 3000 to that object.

have been reduced to writing by the missionaries, and large portions of the Scriptures translated into each.

The Toung-thoos are another race, few in number, scattered over Martaban and the northern part of Tenasserim, and whose communities are found here and there to a considerable distance up the Salwen, at least as far as the latitude of Moné. According to their own traditions, their capital was once established at Thatung, between the Sitang and the Salwen, under a monarch of their own. They are said to be Buddhists, and to have books and priests of their own. Both Talains and Toung-thoos claim as a countryman Budhagosha, who first brought from Ceylon the Buddhist scriptures; but he was in fact a Brahman of Magadha. The name Toung-thoo signifies in Burmese either *Mountaineer* or *Southern*. The name they give themselves is *Pa-au*.* Mr. Mason says that about half the Toung-thoo roots are common to the Pwo Karen. The lists which I have seen show even a greater community.

It is greatly to be desired that a really good account should be obtained of these races, Talains, Toung-thoos and Karens, by some one competent to analyse their languages and sift their traditions. I fear there is no hope that Major Phayre, who is probably the person most competent, will ever have leisure to take up the subject.

A few paragraphs regarding the probable population of Burma will complete this section. Symes estimated the population at seventeen millions, and supposed his estimate rather to fall short of the truth than to exceed it. The empire was then nearly at its acme, but the estimate was founded on the most worthless data.† Cox reduced this to about eight millions. The Rev. H. Malcom says that the chief Woongyee at Ava told him the last census gave a total of 300,000 houses. The tract included is not stated. The enumeration referred to is probably the same as that obtained by Colonel Burney which shall be noticed presently.

Mr. Crawford made four estimates of the population. Two, based on two estimates of the quantity of petroleum consumed in Burma, were dependent on too many hypotheses to be of much value as deductions, though the usual sagacity of that author guided the results wonderfully near what I believe to be the truth. A third was based on the population of the Bassein district as stated in the Burmese records which fell into our hands; and a fourth on the produce of a house-tax said to have been levied about thirty years before his visit. These estimates are respectively—

* Chiefly from 'Mason's Natural Productions of Burma,' p. 442.

† Symes, p. 315.

2,147,200, 3,300,000, 4,416,000, 2,414,000. The last included only the Burmans and Talains.

Of a paper on this subject submitted at the Asiatic Society by Colonel Burney in March, 1835, I find nothing but the following notice.*

"Translation of the official registers of the population of the Burmese Empire, made in 1783, and revised under the present king in 1826. The whole population of Burma Proper from these documents, exclusive of the wild tribes, only amounts to 1,831,467 souls. . . . Colonel Burney having kindly undertaken to look over these papers and prepare them for the press, they were re-delivered into his charge for the present."

Father Sangermano says incidentally that the population of the empire amounts to nearly two millions of souls.† This would appear therefore to be derived from the same return as that of Burney. In both there is an uncertainty as to the area intended. But most probably the term Burma Proper used by Burney was intended to include Pegu and Martaban. The area to which the census applied would, in that case, be about $17\frac{1}{2}$ square degrees, or roundly calculated 78,750 square miles, which would give on Burney's reckoning 23.25 persons per square mile. The whole existing Burmese empire, including those states and tribes whose dependence on Ava is almost nominal, amounts to about 35 square degrees, or twice the area just mentioned; so that the whole population of the present empire will, on this calculation, not exceed twice the amount of Burney's census of 3,663,000.

If we consider how very thinly many parts of the larger area are peopled, such as the large district of Mogoung, and probably the hilly tracts east of Ava, we shall be inclined to consider that this estimate may be taken as a maximum, and sufficient to cover deficiencies in the census on which Burney's calculation was based.

Again, in a return made by Major Phayre in July, 1856, the area and population of the British province of Pegu are thus set down.

	Area, Square Miles.	Population.
District of Rangoon	9,800	137,130
„ Bassein	8,900	128,189
„ Prome	5,500	70,000
„ Henzada	2,200	103,775
„ Toungoo	3,950	34,957
„ Tharawadee	1,950	66,129
Total	32,300	540,180

The Commissioner however considers the assigned population

* Journal of the Asiatic Soc., iv., p. 180.

† P. 76.

much below the real amount. The only clue I have to what he would consider a proper correction is in his remark on Prome, where he observes that recent information renders it probable that the population of that district is 100,000 instead of 70,000. Applying a proportionate correction to the whole population of Pegu, we shall rate it at 771,686.

The area of Aracan appears to be, as far as I can make out, about 10,700 square miles, and its population by the last estimate is 362,797. We shall have then for Aracan and Pegu together, an area of 43,000 square miles, and a population of 1,134,483 or 26·4 per square mile.

We estimated the area of Burma proper with Martaban and Pegu at 78·750 square miles.

	Square Miles.
Maraban may be taken at	3,800
Pegu is known to be	32,300
	<hr/>
	36,100
From this we must deduct the area of the southern part of Aracan included in the present Bassein district ..	1,800
	<hr/>
	34,300

Deducting this from 78,750, we have 44,450 square miles as the probable area of Burma proper, as it is now limited, say from the British boundary to the parallel of 24°. And this area at the joint rate of Pegu and Aracan would give a population for Burma proper of 1,173,480.

Again, taking Dr. Richardson's itinerary from Ava to Kendat,* which extended through what he considered one of the most populous parts of inland Burma, and also through a very badly peopled part near the Kyendwen, we find that it gives 37 villages in a line of 221 miles, or, according to the reduced distances as protracted by Colonel Burney,† in 176 miles. The latter distance gives one village in 4·75 miles. The number of houses is not always stated by Richardson, but filling up such deficiencies conjecturally from the general character ascribed to each village, I find in the 37 villages 3326 houses, or 90 each on the average. And supposing the villages to be no further apart in other directions than on his line of march we shall have 4 houses per square mile, or say 20 souls.

I also find, from a similar analysis of several of Major Allan's routes, that in 925 miles of route there are 155 villages. If the distances in these routes be reduced in the same proportion as Dr. Richardson's, we shall have in 736 miles 155 villages, or one village in 4·8 miles.

* Journal Asiatic Soc., Bengal.

† *Ib.*

Those routes also in which the number of houses is stated give us in 97 villages (excluding the capital cities) 9164 houses, or about 95 houses to a village, i. e. to every tract of 4·8 miles square, or every 23 square miles. This gives 4·13 houses, or to say 20·65 souls per square mile.

These calculations I think are rather confirmatory of the former estimates. 20 per square mile would give for Burma proper, as it now is, a population of only 890,000. But it is to be recollected that this estimate is deduced for the interior of the country generally, and does not apply to the metropolitan districts or to the banks of the great rivers,* which may probably raise the population to about 1,150,000 or 1,200,000.

The general conclusion at which I arrive is, that the population of Burma proper from lat 24° down to our frontier does not probably exceed 1,200,000; and that the population of the whole Burman empire in the most liberal view of what can be included under that designation does not exceed 3,600,000, and probably not more than 3,000,000. We cannot turn from this subject without an enhanced feeling of respect for the nation which, with numbers so limited, has long stood forth to the world as one of the great empires of the east.

SECT. II.—*On the Shan States, tributary to Burma.*†

The Shans, or Tai as they call themselves, are the most extensively diffused, and probably the most numerous of the Indo-Chinese races. Lapping the Burmese round from north-west by north and east to southwest, they are found from the borders of Munnipoor (if the people of that valley have not been indeed themselves modified by Shan blood) to the heart of Yunan, and from the valley of Assam to Bankok and Kamboja; everywhere Buddhist, everywhere to some considerable extent civilised, and everywhere speaking the same language with little variation. This circumstance is very remarkable amid the infinite variety of tongues that we find among tribes in the closest proximity of location and probable kindred throughout those regions. This identity of

* Capt. Macleod in 1839 made the number of villages on the banks of the Irawadi from our present frontier to the capital to be 261, and the number of houses 28,979.

Major Allan's list, compiled by natives who accompanied us up the river, made the number of villages 230, but the number of houses nearly double, viz. 53,780. The mean of these estimates would be 41,389 houses, or say 206,945 souls, on a line of 496 miles.

† Much of the information in this section has been derived from the Journals of Dr. Richardson and Capt. Macleod. It is therefore 20 years old, and some circumstances stated as facts then may be so no longer. Meagre abstracts of those Journals were published in the Journal Asiatic Soc., Bengal, vol. vi., but the complete journals have never been printed.

language appears to indicate that the Shans had attained at least their present degree of civilization, and a probability of their having been united in one polity, before their so wide dispersion and segregation.* The traditions of the Siamese, as well as of the northern Shans, speak of an ancient and great kingdom held by this race in the north of the present Burmese empire, and of the traditions the name of "Great Tai" applied to the people of that quarter appears to be a slight confirmation.† Some fatal want of coherence has split the race into a great number of unconnected principalities, and the kingdom of Siam is now perhaps the only independent Shan state in existence. All the others are subject or tributary to Ava, China, Cochin China, or Siam.

Westward of the Irawadi all their native sovereignties have been suppressed except in the cases of the secluded Kubó valley west of the Kyendwen, and of the petty chieftaincies of the Khamtis in the still more secluded recesses of the extreme north. Of these we have already spoken.

The states of which I am now to give some fragmentary account occupy a tract of country which may be roughly comprehended between the meridians of 97° and 101° , and from the parallel of 24° to that of 20° . This tract terminates on the west with the meridian chain which has been described as forming the eastern boundary of Burma Proper. On the east it may be said, generally, to be bounded by the Mekhong or Great Cambodia River, though several of the states extend their jurisdiction a short distance beyond that limit. On the north it is bounded by that part of the vice-royalty of Yunan protuberant towards the Irawadi and comprising the *Koshanpri* or nine Shan states, which in former times often changed hands‡ between the Chinese and Burmese,

* Vocabularies of the Khamtis, Laos Shans, Siamese, and Shans from Tenasserim, which I have compared, show this identity of speech.

† This Northern Shan kingdom may have been that of Pong, or Mogoung, of which Captain Pemberton has given some history. But the Shan traditions communicated to Colonel Hannay assigned the south-west of Yunan as the seat of the empire, and affirmed that the capital called Kai Khao Mau Long ("the great and splendid city" was situated on the banks of the Shwelee river which joins the Irawadi about the parallel of 24° . ('Notes on Singphos and on the Shan or Tai Nation,' Cal. 1847.

‡ The name of Koshanpri appears to be applied inaccurately by Buchanan to the existing Shan tributaries of Ava in 'Edinburgh Philos. Journal,' x., 246), and Rutter has followed him. My authorities for this location of the Koshanpri (also called Kopydoun) are Burney, in J. A. S. B., vi. p. 124; Hannay's MS. Journal, and his 'Sketch of the Shans' Cal. 1847, and Macleod's MS. 'Journal of Journey to Kiang Hung.' The names of the nine Shan towns are given by Burney as Mangmo, Tsiguen, Hotha, Latha, Mona, Tsanta, Mowun, Kaingma, and Mang-Lyn or Mang-Lyn; and by Macleod the same, with trifling differences in spelling. By Hannay they are given somewhat differently, as Moong-man, Hotha, Latha, Santa, Moongwun, Sanla, Moong-ai, Moong-la, and Moong-tye, or Moongti, of which only the first five appear to be identical with those of Burney's list. Kaingma is the only one of these towns not included in the immediate empire of

but have now long been in the undisputed possession of the former. On the south, the limit is, for a short distance, the territory of the Red Karens, and then right on to the Mekhong the Shan principalities tributary to Siam.

Over all this region the Burmese sway is acknowledged to be of more or less practical effect. In the states adjoining Burma Proper it is an active and oppressive reality, whilst it becomes less and less potential as we travel eastward, and on the extreme east and north-east of the tract which we have defined, though paying homage to Ava by periodical tribute, the states are in much closer relation to China.

The whole of this Shan territory is roughened by a succession of ramifying mountain chains, whose general direction is from north to south, like that of the chief rivers the Salwen and the Mekhong. In the country between those two rivers are also the sources of the Menam, or river of Siam.

Of the sources of the Salwen and Mekhong nothing is known with absolute certainty, though they are generally laid down as the continuations of two of the great rivers of Thibet, delineated in the Lamas' maps sent home by the Jesuits. That the Mekhong is one of these, there can be little doubt; but the inferior amount of water discharged by the Salwen seems scarcely consistent with such a vast length of course as would thus be ascribed to it. Buchanan supposed that the Tibetan river, assigned as identical with the Salwen, might in reality be the main source of the Irawadi. The balance of argument is against any such remote source of the Irawadi, but it seems to me quite probable that both the long-descended Tibetan rivers really join to form the Lantshang Kiang or Mekhong, and that the Salwen has its independent

China. It is, as we shall see below, tributary to both Ava and China. Tsanta (Santa-foo) and Mowun, or Moong-wun (Long-chuen), are in D'Anville's map; and Maing-mo, Hotha and Latha, are given (on Chinese authority probably) in a map in Klaproth's Essay on the Brahmaputra and Irawadi.

These little states appear to be governed immediately by their own Tsaubwas, and to be rather tributaries of China than absolute subjects. Some notice of this region, partly as it would appear from Chinese sources, will be found in an interesting but confused paper by Gutzlaff in the Journal of this Society for 1849, part i., p. 42. Mr. Oldham is my very competent authority for the comparatively very small body of water in the Salwen near where it enters Tenasserim. Dr. Richardson, however, calls it 300 yards wide where he crossed it 200 miles from the mouth in January, 1837. One of the suite of a Burmese ambassador to Peking, who furnished Buchanan with a good deal of information, described the Salwen as a much less important river than the Mekhong, and the latter as being of a much longer course, *emerging round the sources of the other.* (In 'Ed. Philos. Journal,' iii. 35.) The Mekhong is indeed crossed by a suspension-bridge on the road to Yunan from Bamo, whilst the Salwen is crossed by boat. (See Itinerary given by Burney in J. A. S. B., vi. p. 546.) But this is because the rocky channel and violent stream of the Mekhong prevent the use of a ferry. Buchanan's informant crossed the Mekhong by a cradle slung on iron chains, but the embassy of 1833 record their passing by an iron-bridge 105 cubits long and 7 broad. The cubit may be taken at 20 inches, which would give a span of 175 feet.

source not far beyond the northern limits of Yunnan. The general character of the Salween throughout its course seems to be that of a rocky and rapid stream, flowing through a narrow valley, with scarcely any alluvial basins and few inhabitants on its immediate banks. It is said to be navigable, however, for small boats up to the ferry leading from Moné to Kiang Tung in lat. $20^{\circ} 40'$, and even in Yunnan according to Gützlaff. The character of the Mekhong seems to be somewhat similar, allowing for a larger body of water. Within the Chinese territory it is narrow enough to be crossed at several places by iron suspension-bridges,* but at Kiang Hung, in the month of March, Macleod found it to be about 540 feet wide, with a rocky bed, a depth exceeding 15 feet (how much more he could not ascertain without exciting suspicion), and an average velocity of 3 miles an hour. The bed from bank to bank was 1620 feet, with indication of a flood-rise of 50 or 60 feet. It was said to be navigable for canoes all the way down, but not without encountering rapids, particularly between Kiang Kheng and Kiang Tsen, and again near Wintchian or Chanda-poree. Even in ascending to the latter place from the sea in 1641 the Dutch Envoy, Gerard Van Wusthof, met with "horrible waterfalls" or rapids, which compelled the party to unload their boats before attempting to pass up.† The Chinese travellers quoted in Duhalde say that it is navigable for large barks from Kiang Kheng and Kiang Tsen to the sea. Apparently there used to be a good deal of traffic on the Mekhong in the prosperous days of the Lower Laos, but in 1837 Captain Macleod says that trade on the river had entirely ceased since the destruction of Wintchian by the Siamese some years before. The violence and rapidity of the current‡ render the Mekhong dangerous to navigate in the floods.

The mountains in which the tract under consideration abounds are inhabited as usual by a number of more or less wild tribes, known under a variety of names. The most notable of these is perhaps that of the Láwas, who are scattered over the whole of this territory, and are regarded by the Shans as the uncivilised remnant of the aboriginal inhabitants. Their language is said, perhaps on slight grounds, to be quite different from that of the Shans. Notwithstanding the character ascribed to them they appear to be good cultivators, growing indigo, sugarcane, and cotton, and much of the supply of the latter article carried away by the Chinese traders

* One is mentioned in the last note; another on the road from Kaingma to Talee-foo in *J. A. S. B.*, vi. 426.

† Valentyn, *Beschryving van Oost-Indien*, vol. iii., part ii. Tonkin and Cambodia, p. 50.

‡ Relation du Royaume de Lao in *'Histoire Nouvelle et Curieuse des Royaumes de Tunquin et de Lao du P. de Marini'* Paris, 1666.

from Kiang Hung, Kiang Tung, and the adjoining states, is grown by them. They also manufacture iron, and are good smiths, making dhas, or cutlasses, and even matchlocks. They are described by Macleod as short, ill-made, and ugly, with flat noses, low foreheads, and protuberant bellies. The name of Láwa seems to be applied by the Chinese to all the chief nations on the south-western frontier of Yunan, including the Burmese, who, according to F. Buchanan, are called Lawa Meen. Among the Shans themselves, the people of the states of Wintchian and Lantchian (otherwise called Chandapoore, and Muang-Luang-Phaban), on the Mekhong, only are known as *Lau*. I do not know from which side our geographers got the appellation of Laos; but probably it is only an European plural of the last-named word, which has been applied to the whole Shan country. From these circumstances, however, it seems not unlikely that the Láwas are a deteriorated type of the progenitors of the Shans before the race was modified by Buddhist civilisation, as the Kookees are supposed to represent the progenitors of the people of Munnipúr, and the forest-races of the Deccan the communities of Southern India, before they were modified by Hindoo civilisation. The largest, most savage, and most independent bodies of the Lawas are found in the country northward and westward of Muang-Lem. They admit no one into their country, and are said to lie in ambush for travellers, whom they surprise and decapitate, carrying off the heads as offerings and trophies, like the Garos, Kokees, and other savage neighbours of our Sylhet frontier in Bengal, as well as of the Dyaks of Borneo.

The *Kakuis* are another race of mountaineers scattered over the Kiang Hung and Kiang Tung territory as well as further north. A large body of them exist in independence in the mountains northwest of Kiang Hung, and are notorious caterans. They use the cross-bow with poisoned arrows, spears, and a few matchlocks. The *Kakuas* are a kindred tribe considered to be more civilised than the last, and inhabiting the mountains on both banks of the Mekhong.

These tribes are probably connected with the Kakoos or Kakhyens of northern Burma, but there is no proof of this beyond the obvious similarity of name. Some Chinese at Kiang Hung however told Macleod that the Kakuis and Kakuas were from the hills near Talee-foo, which strengthens the probability of their being Kakhyens. Another small tribe in the neighbourhood of Kiang Tung is called *Musta*. Of these we have no particulars, but the name is suggestive of the wild mountaineers of the interior of southern China called Myau-tse.

Lau-Laus are also mentioned by Macleod as dwelling on the east of the Mekhong and tributary to Kiang Hung. This name

is doubtless the same as the Lolos of Duhalde, though the description of the Lolos given by that author* applies undoubtedly to the civilised and Buddhist Shans of Yunnan.

The *Li-Lun*, another tribe under China to the northward of Kiang Hung, are said to be the chief growers of the inferior opium which is brought down to Ava by the Chinese merchants. Besides these there are in the neighbourhood of the Mekhong, *Yem*, *Kali*, *Putai*, *Kapin*, *Kalau*, *Kadams*, *Kamu*, and *Kamet*, of whom the names only are known.

A few Karens are found further east than we should have expected, to the north-east of Zimmé, and not more than 50 or 60 miles from the Cambodia river. And small communities of the Tounghthoos are met with sparsely up the Salwen, and in the territories of Nyoung-yuwe and Moué. In the same region are Yeins, Dumoos, and Dunós. Of the Yeins, who are probably the same as the Yems of the Mekhong, and are also said to be found in the northern part of Koshanpri, we know only the name. The Dumoos and Dunós are said to speak a kind of Burmese, and perhaps may be a relic of the original uncivilised Myamma. The Dunós, like the Paloungs, are said to be tea-growers.†

Towards the Chinese frontier in the districts of Toungh-bain and Thein-nee are the tea-growing Paloungs, of whom we have spoken in the previous section. The Paloungs (called also Paloo) are said to resemble the Shans and to be of Shan kindred. It is however remarkable, considering how often the *name* of such a race is merely the word for *man* in its own or some kindred tongue,‡ that *Hplón* has this meaning in one of the Karen dialects of lower Burma. Mixed with these, and stretching far to the north through Yunnan and beyond our present bounds, are the numerous tribes of Kakhyens.

These various tribes occupy the hills and wilder parts of the region. The alluvial basins are occupied by the Shans, who dam the streams and carry irrigation by numerous cuts and bamboo wheels over the rice-lands. The climate indicated appears to be of a more temperate character than in the same latitude in Ava. Extensive pine-forests are met with in all the hilly parts of the region even down to our Tenasserim and Martaban frontier, and the pine is often found in near proximity to the teak and saul, which we are accustomed to regard as the types of such a very different climate. On the Mekhong, teak of useful quality is however scarcely found so far north as Kiang-Hung, in lat. 22°,

* Vol. i. p. 30 (English translation in folio).

† Malcolm's Travels, ii. p. 240.

‡ *See* *l. c.* In the Singpho language *Shang* = *Man*; in the Khyeng, *Klang* or *Khyang* see Major Phayre in J. A. S. B. 1853. pp. 14, 15), has the same meaning, as well as the *Kme*, *Kma*, and *Mra* of the other tribes of Aracan Yoma so designated.

though some of the finest teak of the Irawadi valley grows at least two degrees further north. The areca does not grow at all within our proper limit, at least not eastward of the Salwen, though cultivated with success at Madéya north of Amarapura. And elephants are not met with in a wild state north of $21^{\circ} 20'$, and at Kiang-Hung when domesticated do not thrive, though found in India roaming wild at least as far north as Dehra in lat. $30\frac{1}{2}^{\circ}$.* Chinese furs are habitually worn in winter by the nobles of Kiang-Tung and Kiang-Hung. Tea is grown abundantly over the tract between the Mekhong and the Salwen, and also west of the latter river above the latitude of Ava. Cotton too is produced in considerable quantities by some of the hill tribes, and is purchased largely from them by the Chinese traders who come down through all these principalities annually.

Before entering on such fragmentary details regarding these principalities as I have been able to collect, some notice must be taken of the Karen-nee or Red Karens, as they are called by the Burmans, who have remained independent of both Burmese and Shans.

The country occupied by these people is that part of the mountain mass separating the Sitang from the Salwen which lies between the latitude of Toungoo and that of $20^{\circ} 30'$.

Little is known of these people except from the Journals of Dr. Richardson, who passed through their country more than once. It is generally believed that they are not in any way closely allied to the Karens proper of Pegu and Tenasserim, but that they are rather of Shan race. I have not been able to find any farther proof of the latter kindred than their being a *gens braccata*. Dr. Richardson thought that their language was a dialect of that spoken by the Karen tribes to the south of their country, and I should think it probable that some ethnographic instinct had induced the Burmese to give them the same name.† The appellation of *red* Dr. Richardson derives from their complexion, naturally rather fair and tanned to a ruddy hue. But the red breeches which he describes them as wearing suggest as likely an origin for the name, the Shan breeches being blue.

* Tigers, however, appear to be very numerous over the country, especially on the desolated border-land between the Burmese and Siamese Shans.

† I can find only one Karen-nee term recorded, so that the materials for determining the kindred of the people are much on the same scale with those for determining the kindred of the Picts, which, according to the illustrious Jonathan Oldbuck, consisted of one word (*Pen-ud*), of which one-half was Celtic and the other half Saxon. In the present instance, however, the one word is in favour of Karen connexion. Dr. Richardson tells us that the Red Karens call the Salwen *Kwé-lo Ké-lo*. Now, according to a list of Pwo Karen vocables, *Ké-lo* is a word for river in that dialect. I see, Mr. Mason says, from Karen testimony confirmed by knowledge of a few words, that the Karen-nee have many roots common to the Pwo and Sgau dialects. ('Nat. Prod.' p. 477.)

The name which the Karen-nee give themselves is *Koya* : by the Shans they are called *Niang*. They have some myth about their being the descendants of part of a Chinese force, which overslept itself and was left behind on a retreat by the main body. It is curious that the Khyens of the Yomadoung have almost the same tradition regarding their own origin, substituting a Burmese for a Chinese army.*

The Red Karens are a people of small stature, with spindle shanks and projecting stomachs, rude and filthy in their habits. They are, however, far from absolute savagery, and many Shans at one time settled in their country, finding them as lords, preferable to the Burmese. Their only religious observances consist in the propitiation of the malignant spirits who inflict disease. Sacrifices for this purpose are carried to an extravagant extent. They are civilised enough to use a coarse silver bullion for currency, with the Burmese weights, and their cultivation is remarkable for its neatness.

The whole country is mountainous, and in the southern part of their district the mountains rise to a height of about 8000 feet. Their villages are generally perched on rounded knolls, or on the tops of tabular hills. The population is considerable. In one part of their country, between the Salwen and the Mepon, Dr. Richardson found the land cultivated to the tops of the hills, the valleys terraced in the Chinese manner, cross-roads in all directions, and villages so numerous that eight were visible at one time. Their largest village is called Ngwé-doung. It is planted on the top of an extensive terraced table-land on the west side of the Mepon. The inhabitants are, however, chiefly Shan fugitives.

These Red Karens are the terror of all the adjoining Burma and Burma Shan districts, on which they make their forays, carrying off the inhabitants, and selling them in exchange for buffaloes and oxen into hopeless slavery among the Siamese Shans. They are also the receivers of slaves carried off in the mutual feuds of the numerous small Karen communities along their borders on the side of Toungoo.† The nearest towns pay them black-mail to

* Are not these traditions, and those others in which we find dispersed and depressed tribes in Burma, like the Toungthoos, the Pwons, and the Kadós, pointing to mouldering and jungle grown traces of ramparts as the sites of the cities of their fathers, indications of the error of that theory that the savage was "the seed out of which in due time the civilized man was unfolded?" (See 'Trench on the Study of Words,' 2nd Edition, p. 14.)

† 'MS. Report from Mr. O'Riley, Assist. Commissioner of Toungoo.' At one place among the *Karen-nee*, or Wild Karens, eastward of the Sitang, there were brought before Mr. O'Riley eight men and boys, three women and thirteen young children, the remains of ten houses that had been foraged by others of the same race, in order to meet demands for tribute by the Karen-nee. The men had lost their wives and children, the women their husbands, and all the children their parents. Fifty persons had been carried off.

purchase immunity from their inroads. These used to extend so far that the people of Nyoungyuwé, twenty miles from their frontier, had to keep watch and ward against them.

The Shan principalities may be conveniently divided into Cis-Salwen and Trans-Salwen. Of the Cis-Salwen states, commencing from the Karen-nee country which forms their southern limit, the first is Mobyé. This little state lying close to the Red Karens was so harried by them that nothing remained to the Tsaubwa beyond the walls of his town. At last, as he could get no aid from Ava, he ceased to send tribute to that court, and transferred his allegiance to his ceteran neighbours. In 1837 the town was said not to contain more than 50 houses.*

II. The next state is Mokmé or MOUNG-MÉ, about five days journey N.E. from Mobyé, and three days from the Karen-nee frontier; this little state has also been much harassed and reduced by the forays of the Red Karens, and all the chief villages pay them blackmail. The town of Mokmé contains about 350 houses. The territory is small.

III. Two days north of Mokmé is the chief town of the state of Moné. This is the seat of the presidency of the Burmese over the Shan principalities, and the Burmans are rather numerous. Though the limits cannot be laid down with precision, the territory is considerable, extending to some distance across the Salwen, and the town, which stands about 2000 feet above the sea, is the largest of all the little Shan capitals, and may perhaps contain 8000 souls. It is built along the foot of the hills bounding the fertile valley of the Nam-tween, a tributary of the Me-Ting.

IV. About five and thirty miles S.W. of Moné (though the distance by road is much longer) is Nyoung-yuwé, called also Nyoung-shwé. This is the most westerly of the states, and was formerly one of the largest and most important, being one of the four which embraced the whole of Kamboja-Taing,† a term in-

* Considerably south of Mobyé, but east of the Salwen, was formerly a state very much detached from the others but tributary to Ava, called Meinlein-gyee or Yunsalen. It is spoken of by Buchanan, and is perhaps the kingdom Jacaçalon of Ferdinand Pinto, though he speaks as if it were the Irawadi. It has long been subject to Zimmé, and the capital is represented by a hamlet of ten or twelve houses, though an extensive rampart and ditch still testify to former importance.

† I do not know whether this name has any relation to the Kamboja of Geographers, or whether it is a mere accidental consonance. It does not, however, sound like Burmese, and is doubtless one of the Palee names which attach to all the principal divisions of Burma and the Shan country. Gutzlaff says ('Jour. R. Geog. Society,' xix., p. 88) that Kambodia or Kamboja, as applied to the delta of the Mekhong, is a name taken from the [Buddhist] sacred books. The Palee names of places in Indo-China are often transfers of the names of places in the sacred land of India. So in Burma we have Maithila and Kosambhee, and in Siam we have Ayodhya. Kamboja was the Sanscrit name of a people on the N.W. of India, who Lassen ('Ind. Alterthum,' p. 598) says were a tribe of degenerate Kshatriyas.

cluding the whole of the Cis-Salwenic Shans up to Bamó, if not to Mogoung. But by Karen forays, Burman oppression, and domestic contests, the Tsaubwa's dominion is sadly reduced, and probably now does not contain 1000 houses altogether.

In the town there are not more than 150 houses. This lies in a rather extensive alluvial basin at a height of about 2500 feet above the sea. The whole appears to have been a lake-bed, like the somewhat similar valley of Munnipúr, and a lake still exists in the middle of the valley, extending about 14 miles in length by about $3\frac{1}{2}$ in width at the broadest part. It is shallow, not in the dry season exceeding $7\frac{1}{2}$ feet in depth anywhere, and it appears to be still contracting.

Though the number of houses in the Tsaubwa's territory is so small, there is in the valley a considerable population, besides that which is directly tributary to the court of Ava. The level part of the country is rather extensively cultivated with rice, sugarcane, maize, &c.

Among the inhabitants of the valley is a colony of Tavoyers, who retain a dialect resembling that of Tavoy. They are in a low state of civilisation, and have no knowledge of the emigration of their forefathers. But the traditions of the Shans or Burmese say that they were brought here by the ancient Burman monarch Narapati tseethoo,* who reigned, according to Crawford's table, between 1157 and 1190, but according to other authorities in the following century. A similar tradition attaches to a town called Thatung, five days south-east of Nyoung-yuwé, on the border of the Karen-nees, to whom it pays tribute. The inhabitants of this place are said to have been brought from the ancient city of Thatung in the present province of Martaban by the great king Nauratha-men-zau, the founder of the Shwé-zeegoong Pagoda at Pagan.

The lake of Nyoung-yuwé is that which occupies in the maps derived from F. Buchanan such a curious position, radiating rivers to all points of the compass. The real outlet of the lake is by the river of Molyé, which passes the little Shan city of that name, and discharges itself into the Mepon and so into the Salwen. It is reported to flow underground for a mile or two before joining the

* "According to Tavoy historians Narapati-Sæthoo came to Tavoy more, as is represented, as an apostle of religion than as a conqueror, and founded the first city that was ever built in that province in A.D. 1298. He built the Pagoda on Tavoy point, which is the oldest of which there are any records, and he was probably the first to place Buddhism on a permanent basis in that region." ('Mason's *Nat. Prod. of Burma*, p. 453. Many traditions of the valley of Nyoung-yuwé are connected with the same monarch. He is said to have defeated an immense Chinese army which attacked the old city of Kosambhee, formerly the capital of the valley, and the extensive traces of which exist two or three miles north of the present town. Under the waters of the lake are also seen certain rows of wooden posts which the Shans believe to have been the pillars of his Palace.

Mepon. The people also believe that there is a subterranean escape from the lake itself at a spot where a bubbling extrication of gas takes place. Some story connected with this belief may have led to the geographical error just alluded to.

The principal feeder of the lake is the Borathat, a stream flowing down from the mountains immediately east of Ava. The surface of this lake presents the singular spectacle of a multitude of floating islands. They are composed of the interlaced roots of a coarse grass or reed, loaded with a little soil. The roots of the grass shoot down to the bottom of the lake in dry weather, but in the rains many of these entangled masses are buoyed up and separated from the ground so as to be quite afloat. The inhabitants often occupy them as fishing stations, or even erect their cottages on them, anchoring the islands to the bottom by long bamboos. They undulate at every step, and a man's house, sometimes during a squall, changes front to every point of the compass. Some of these islands are so large as to afford space for three or four cottages.*

There is scarcely any wood in the valley of Nyoung-yuwé, and the people are obliged to purchase their boats from the Red Karens. The nominal contingent of Nyoung-yuwé is 1565 men, but 500 is the utmost that they can raise, and these they cannot keep in the field for any length of time. From the lake of Nyoung-yuwé to the pass of Nat-teik descending upon the plains of Ava, extends the hilly district called Myelat, which is under no Tsaubwa, but pays revenue direct to the king, and hence is known as *Ngwégoon*, or "the silver-taxed."

V. Bordering Moné towards the north, and Nyoung-yuwé towards the north-east, is the state of Le-gya, formerly mustering under the banner of Nyoung-yuwé, but within the present century raised to the position of a Tsaubwship. It is one of the most prosperous of the states. The chief town is said to contain as many houses as Moné, that is to say, about 1600. The two Shan ladies, mentioned in the histories of the first Burmese war,† as being killed in action at the Naweng river, near Prome, in November, 1825, were two wives of the then Tsaubwa of Legya, who, from some superstition, were brought into the field dressed in male attire. Very lately the arbitrary conduct of the chief Burman official at Moné caused an armed rising among the people of Legya; but the good sense of the king very speedily put a stop to it without armed interference.

VI. North of Légya, and according to Richardson's sketch on

* "A very fat old woman on one island, where we landed for breakfast, laughed heartily at some apprehension displayed by one of my people, who was about half her weight, that he might go through." (Richardson's MS. Journal.)

† 'Two Years in Ava,' p. 225; Snodgrass, p. 235.

the banks of the Myit-ngé, is Theebo. It appears to be a very small state. The most direct road from Amarapoora to China lies through Theebo and Thein-nee. Thoung-zé is a Shan district between Theebo and Ava, and I believe that the king has here re-established a Tsaubwa.

Momeit, a very considerable territory to the eastward of the Irawadi above the capital, was in former reigns under a Burman governor. I do not know whether the Tsaubwa here also has been restored. The town stands on a small river (the Nam-meit) running into the Shwé-lee. It is the district within which lie the celebrated ruby-mines of Mogout and Kyat-pen. East of Momeit is the district of Toung-baing, but I do not find that there either a Tsaubwa is recognised.

VII. The last of the Tsaubwa-ships on this side of the Salwen is Theinnee, called by the Shans Tsen-vee. The town is a considerable one, containing 500 or 600 houses. It lies twelve marches east of Ava on the most direct road to Yunan, and thirteen north, or north by east, from Moné, but its position cannot be laid down with any exactness. Its territory extends a short distance across the Salwen, to a river called Nam-boung.*

Thein-nee has the most extensive territory of all the principalities, though not the most populous. It furnishes, however, a contingent equal to those of all the other Cis-Salwenic states. The Tsaubwa, according to Richardson, used to pay some homage to China. The state is at present under a Burman governor, but I understand that it is the king's intention to restore the Tsaubwa here also. All the preceding states, with the exception of Mobyé, pay tribute twice a year to Ava. We now cross the Salwen and begin from the north.

VIII. Beyond the Salwen, the most northerly is the state (or two confederated states-) of Kaingma-Maingmaing; Kaingma, as we have seen above, is one of the nine Shan cities or Koshan-pri. This state, which has a considerable territory, pays tribute to Ava, but not annually. It is in much closer relation to China, probably much on the same footing as Kiang-Hung, and it is indeed, like that state, embodied in the Jesuit's map of Yunan. Gützlaff speaks of its well irrigated soil and dense agricultural population.†

Within the territory of this state, I believe, should be placed the great silver-mine (Bau-dwen-gyee), the position of which has been hitherto laid down in the maps as on the west of the Salwen near Toungbaing.

The accurate Chinese traveller, whose account is given in

* See Itinerary Journal of the As. Soc. of Bengal, vi. p. 425.

† Journal of Royal Geograph. Society, xix. 43.

Duhalde, tells us that, besides silver,—tin, copper, iron and rocksalt are worked in the territories of Maing-maing (Mohang Meng), and also that the musk animal is found there; which seems to imply the existence of very high mountains. The mountains covered with perpetual snow of which Gützlaff speaks, would appear indeed to be in this territory.*

Between Thein-nee and Kaingma there is a small state called Muang Ting or Maing-Tein, along the banks of the Nan-ting. I do not know whether it is considered tributary to Burma.†

IX. South of the last is Maing-leng-gyee (Muang Lem of the Shans). Of this, as of Kaingma, scarcely any thing is known. A considerable part of the territory northward and westward of Muang-Lem is occupied, as we have before noticed, by a savage race of Lawas, who prevent all passage through their country. Gold is said to be abundant in their hills, and they exchange a little with the Shans for salt, areca, cattle, and silver. They are said to be very numerous, and to cluster in large villages of 400 or 500 houses under separate chiefs. These communities are often at war among themselves. The Ava contingent of Maing-leng-gyee is nominally 3000 men. It pays tribute to Ava annually, and triennially to China.

X. South-east of Maing-leng-gyee, and extending on both sides of the Mekhong, is the state of Kiang-Hung, called by the Burmese Kaing-yung-gyee, one of the most important of the Tsaubwashes. It appears to be the Tarout-Shan (Chinese Shan) country of Dr. Buchanan.

This state sends tribute to Ava once in three years, but it is much more immediately under Chinese influence, and the Chinese dress, customs, and language, prevail more or less among the nobles. It is called by the Chinese Chelee, and under the name of Tcheli-chuen-fou-se, it will be found in D'Anville's map of Yunan. In fact, the Chinese exercise an immediate interference, maintaining an establishment of clerks and fiscal officers, and collect a revenue assessed on the amount of seed sown, besides 65½ viss of silver from the Tsaubwa's government, and a large quantity of tea, said by Captain Macleod to amount to 560 mule-loads. Of this, 25 mule-loads, made from the tender shoots, were universally said to be destined for the emperor himself. This importation of tea into China is an example of "coals to Newcastle" that will perhaps be new to the readers of this report.‡

* Compare Itinerary before quoted; J. Geogr. Soc., and D'Anville's Map of Yunan.

† Edin. Phil. Jour., x. 59.

‡ The Burmese Governor and his followers, with whom Dr. Bayfield travelled up the Irawadi, treated as preposterous his statement that tea was produced in China. It seemed as absurd to them as it would seem to us to say that Ireland

There are twelve petty Tsaubwas in confederacy under the Kiang-Hung chief, whose own proper title is *Tsen-wi-fua*.

Four of these feudatories lie to the west, and eight to the east of the Mekhong, and the most easterly border on territories belonging to Tonquin.

On the west of the Mekhong they are separated from China, or perhaps rather from Kaingma, by savage tribes of Kakuis. But on the east of that river the state of Kiang-Hung comes into immediate contact with what we consider to be China proper at the town of Muang-La, which is parted only by a small river from the Chinese town of Esmok. The latter is under the government of Shuenlee, a subdivision of the great province of Yunan; Shuenlee is I believe (from the comparison of Burman routes in China given by Col. Burney in the *Journal of the Asiatic Society of Bengal*, vi. p. 426, &c.) the city called in D'Anville Chunning-fou.

By this route the caravans of Chinese traders, chiefly Mahomedans,* come down to traffic at Kiang-Hung, Kiang-Tung, and the principalities under Siam. It was chiefly with the view of inducing these caravans to extend their annual journeys to Maulmain that Capt. Macleod undertook his remarkable journey to these remote states in 1837; but the jealousies and obstructions among the intervening Siamese Shans prevented the accomplishment of his object.

The city of Kiang-Hung is situated to the westward of the Mekhong, on the side of a low range of hills, near where a stream called the Me-Ha joins that river. It is not walled, nor is there any fort. The palace is a prominent building on high ground at the northern end. It is handsome and substantial, adorned with carving and gilding in the Chinese style, and roofed with highly glazed tiles. Much stone is also used in the substructure.

The town does not contain more than 400 houses, many of which are planted on little terraces cut in the hill side. There are a few monasteries and small pagodas; but besides the Tsaubwa's palace, there is not a good house in the place, nor a single one of timber.

The tribute to Ava is more an honorary payment than a substantial one like that to China. It consists of a small gold cup, a gold and silver flower, with pieces of silk and tinsel, a pair of shoes, salt, tea, and gilt candles, from each of the twelve feudatory Tsaubwas. The Tsenwifua's homage to Ava is of a similar character,

supplied Jamaica with sugar. They looked on China purely as a tea-importing country. This shows that none of the tea at Amara-pura comes from China as we had believed.

* These Chinese generally claimed both Richardson and Macleod as co-religionists. They were always found very civil. They were often accompanied by dogs of large size, the same breed doubtless, though not quite so big, as Marco Polo's dogs of *L. et*, which he says were the size of donkeys.

with the addition of two ponies. Each petty Tsaubwa offers his own lord annually the same presents that he sends triennially to Ava.

The Ava contingent from Kiang-Hung is 5000 men. The Chinese claim no military service in this way from any of the Shan States under their influence.

XI. Another important principality is Kiang-Tung, called by the Burmese, Kaing-Toung-gyee.

The city giving name to this state is about midway between the Salwen and the Mekhong, but the territory itself extends nearly from the one river to the other, embracing Muang-Niong, Kiang-Tsen or Kiang-Then, and several other states once independent. Kiang-Tsen, on the banks of the Mekhong, was once a place of considerable importance.

The town of Kiang-Tung stands on low undulating hills. The ground is of a similar character, intermingled with swampy hollows on the east, south, and west. North-east, north, and north-west, level cultivation extends for several miles, beyond which high mountains rise suddenly. Kiang-Tung does not contain more than 600 or 700 houses, and those of a mean character and widely scattered. It is surrounded by an extensive and irregular wall of brick and mud about 15 feet high, fenced on the outside either by swamps, or by an artificial ditch. The ditch, where the wall passes over high ground, is cut down to the level of the swamp, and is in some places 70 feet deep. The palace is in the centre of the town, a building of very shabby exterior, but internally handsome and richly adorned, with a throne and other royal insignia on the Ava model. The people of Kiang-Tung are called by the Burmese *Gong*; and the country is often called *Gong thoungzé nhit Myo*, "the thirty-two cities of the Gong."

No regular taxes are levied by the Tsaubwa on his own account. His revenue is derived from the crops of his own domains, from trade, and from presents offered annually by his Myotsas or feudatories, and by the people generally. A part of the fines also in criminal cases goes to the Tsaubwa. In all suits for money, 20 per cent. on the value in dispute is the perquisite of the adjudicating officer.

The whole force of the Kiang-Tung territory, including the hill tribes, is said to amount to 30,000 men. The contingent for Ava is 5000. When the Shan contingents were called out in the first war with us, no troops from Kiang-Tung were employed, on the plea that they were required to watch the Siamese.

In the beginning of this century, the then reigning Tsaubwa, with many of his people, in disgust with Burmese oppression, went over to Zimme and put themselves under the jurisdiction of the Siamese. The promises of the latter were all broken, but the

emigration added considerably to the population of the Zimmé principalities.

XII. The last of the Tsaubwa-ships is Kiang-khen (*Burm.* Kaing-Khyaing), the most easterly state having any relations with the court of Ava. It is a small state I believe, but I find no particulars regarding it, except the amount of its contingent which is 1000 men. Some twenty or thirty years ago the Tsaubwa wished to place himself under Chinese protection, but the Chinese Government declined the offer. The town of Kiang-khen stands on the right bank of the Cambodia river, according to Macleod, in about lat. $18^{\circ} 54'$, but, for reasons assigned in the preceding section, I believe it ought to be higher.

The Tsaubwas of all these principalities, even where most absolutely under Ava, retain all the forms and appurtenances of royalty. They assume to themselves a multiplicity of wives, like their Lord at Ava: like him they espouse their half-sisters to preserve the purity of the blood-royal, and doubtless would justify the practice by a claim of descent from the house of Sakya; they have their Ein-shé-Men (or Cæsar), their Atwen-Woons (or Household Ministers), and other officials of the court. Their palaces have the reiterated roof, the *pyathat*, or storied spire, and sacred *htee*, or umbrella on its apex. They have also the Yajapalén or kingly throne, and the white umbrella with the rest of the five ensigns of royalty. But these latter they possess only as the Vicar of Wakefield's daughters possessed their crown-pieces; they are theirs, but they must not be made use of.

The existence to this day of these numerous Reguli, with all the paraphernalia of royalty, explains, and to a certain extent justifies, the statements of the old travellers, that Tshenbyo-Myayen, the great king of Pegu, had six-and-twenty crowned kings for his vassals.*

All these states are under the real or nominal supervision of the Bo-mhoo-mentha, whose presidency or seat of administration is at Moné. He generally, however, resides at Ava, only visiting Moné occasionally. His duties are conducted in his absence by a deputy called the Tsitké-daugyee,† who is obliged to leave his family at court as pledges for his loyalty. The Tsitké-daugyee has various subordinate officials under him at Moné, and either one or two inferior Tsitkés are posted at the court of each Tsaubwa, in the capacity of Residents as we should call them in India.

The amount of authority exercised over these states by the

* Thus, Cæsar Frederick: "There is not a king on earth that hath more power or strength than this king of Pegue, because he hath twenty and six crowned kings at his command." Purchas, p. ii. 1715.

† "Great Royal Sheriff."

Burmans varies nearly with their distance from Ava. Over those nearly in contact with the king's immediate territories, it is (or used to be) exercised with oppressive rigour. Over Kiang-Hung and Kaingma it cannot be more than the peaceful policy of China permits. The tribute from these remoter states is, as we have seen in the case of Kiang-Hung, little more than an honorary token of fealty. Similar presents are made by all the other princes at the *Kodau* or Beg-Pardon festivals, with more or less frequency according to the custom established in each case, those near the Burman border offering them twice a year, viz. at the New Year and at the end of the *Wa* or Buddhist Lent. But those nearer states are also subject to arbitrary exactions of unlimited amount, and are saddled with a number of hungry Burmans who make such spoil of the natives as they can.

This at least was the state of things during the preceding reigns. But it is understood that the present king has done much to conciliate the Shans, both princes and people, and that the serious insurrections which were formerly chronic in this region, have ceased since his assumption of the throne.

The whole contingent of the Shan states was stated to Richardson by the Tsaubwa of Moné to be 91,147, and the former supposed that the prince has used a common Burman hyperbole in multiplying by ten. The aggregate of the nominal contingents must, however, be more than 9000 men. These are, as we have seen, for Nyoungyuwe 1565, for Muang Lem 3000, Kiang-Hung and Kiang-Tung 5000 each, Kiang-Kheng 1000, and allowing 5000 for Thein-nee, Moné, and the other Cis-Salwenic states, we should have a total of upwards of 20,000. The Shan contingents are never called out except in very critical circumstances. They were summoned in the second campaign of the first Burmese war, and the force then furnished amounted probably to 8000 or 9000 men.

All the travellers whose journals I have consulted speak in unconscious unison of the bitter feeling with which the Burmese are regarded by all the alien tribes which are in any way subject to their authority. And they speak with a like unanimity of the high character which was ascribed to the Chinese for justice, moderation, and good faith.

The domestic administration of the Tsaubwas themselves appears to be generally of a milder and more paternal character than that of Ava. The princes and nobles show much more of blood and refinement, as distinguished from the commonalty, than it is usual to see in Burma, where there is little distinction of this kind to be observed. The blind Tsaubwa of Kiang-Tung is described by Macleod as a very noble gentleman.*

* Some of the customs of these Shan princes seem to have a strong dash of

The Tsaubwa-ship is hereditary in the royal family of each principality, but the individual successor to the throne is appointed from Ava. He is generally designated beforehand as Ein-shé Men, a dignity conveying considerable powers to the prince as a sort of Cæsar in the state. In the principalities of Kaingma, Muang Lem, and Kiang-Hung, there is some joint arrangement between Ava and China, the successor being named by one government and confirmed by the other. Sometimes, however, the two governments have granted their nomination to different individuals, and wars of succession have ensued. Indeed such feuds and petty wars seem to have been very common among all these little states, and have doubtless tended greatly to throw them under the power of their more united neighbours.

As in all the Indo-Chinese countries there seem to be traces over these states of greater wealth and population than now exist. Deserted cities are frequently spoken of; and all the apparatus of royalty about the faded courts of the princes seems to suggest a by-gone period of greater opulence and power than the present.

The great cities with which geographers have besprinkled this terra incognita are now, we see, nothing more than considerable villages of bamboo huts. Yet within this region, if anywhere beneath the moon, must have been the great city of Timplan, the capital of the magnificent Kalaminhm, of which Mendez Pinto gives such an extravagant account. South of the states of which we last spoke, are other principalities of like calibre, but owing their allegiance to Siam instead of Ava.

The chief of these is Zimmé (Kiang-Ma) with its confederate states of Lapung or Labong, and Lagong, all situated on the feeders of the Menam or river of Bangkok. These, with several of the adjoining districts, once formed a considerable state extending from the Salwen to the Mekhong, which is often mentioned by the earlier European travellers as the kingdom of Jangomai, Chacomai, Jamahey, &c. It contained 57 walled towns, the ruins of many of which can still be traced. The population of the states named was considered by Macleod in 1837 to be highly estimated at 90,000. They were conquered by the great Peguan sovereign Tshenbyomyayen, and after the fall of Pegu, in the beginning of the 17th century, passed under the Burmese. From these last they revolted in the latter part of the last century, and put themselves under Siam, to which they remain tributary. The greater part of their tribute is paid in teak timber.

primitive simplicity. In the Zimmé states, at least, all the chiefs, from the Tsaubwas downwards, at harvest time remove with their families and followers into the fields, and reside there in temporary sheds, superintending and assisting in collecting and threshing the crop. So in primitive times, Boaz, "a mighty man of wealth," came to superintend his reapers and slept by the heap of corn on the threshing-floor.

The town of Zimmé contains from 700 to 1000 houses, with an inner and outer fort. The inner fort is a square of 2050 paces, surrounded by a wall 22 feet high, with bastions and a broad ditch. Pagodas,* worship houses, and monasteries occupy the greater part of both the enclosures, and artificial water-courses intersect the town in all directions. The priests are here very numerous, and bear a much less respectable character than in Burma. A number of fine cattle are bred in this country, and the chief supply of Maulmain used to be (perhaps is still) drawn thence. There is little or no other trade in the place, and the goods brought by the cattle-merchants scarcely used to fetch the price they cost at Maulmain. Through all these southern Shan states the elephant is used with a frequency and familiarity unknown in any other region of the East. The little state of Zimmé alone is said to possess 1000 elephants in a state of domestication. They are habitually used in all the work of daily life, and may commonly be seen grazing in the fields along with horned cattle.

Muang Nan and Muang Phé are two other small states in similar confederacy with one another, between Zimmé and the Mekhong. They formed part of the old realm of Kiang-Mai.

Farther east, on both sides of the Mekhong, is the principality of Muang-Luang-Phaban, or Lantchian.† It appears now to be the largest of the Southern Shan states. The chief town is described as standing on the east bank of the Mekhong, surrounded by a wall, with a fortified hill in the centre. East of the town are high and impassable mountains. The position of

* In the middle of Zimmé is a pagoda on the top of an earthen mound, of which a curious story is told. A powerful Chinese army besieged the town. The Zimméers were unable to cope with them in war, but proposed that each party should build a pagoda, the htee of which should be distinctly seen by the enemy, and that the party whose pagoda was first finished should be considered the victors. The Zimmé people, masked by thick groves, heap'd up a mound of earth and put a little brickwork at the top to support the htee, which was speedily erected. The Chinese, who had worked honestly, acknowledged themselves beaten, and departed, leaving their pagoda, the very bricks whereof are alive this day, like those of Jack Cade's father's chimney, to testify thereof.

The story recalls the explanation I once heard given by a Bengalee villager of certain scratches on the trunk of a tree near a notorious patch of tiger-jungle. "Sir," he said, "when two tigers quarrel about the occupation of this piece of jungle, they measure themselves against this tree, and the one who can scratch it highest is the conqueror; the other goes off;" *quit it about his patom.*

† Lantchian signifies "a million of elephants." It is the Lensen of the Burmese and the *Loupiennes* of Mr. Fitch (see p. xxii. of Appendix). *Lantchian* (Lantchian) is described by the Père Marini as the capital of the great kingdom of Lao, of which he published a description. The book appears to be compiled from the relation of missionaries who were resident in that kingdom at the beginning of the 17th century, but it is exceedingly vague and uninforming, and contains not a single proper name from which to ascertain what provinces were supposed to be included under the name.

Lantchian is probably in about $17^{\circ} 45'$ to 18° of latitude, and $103^{\circ} 45'$ of longitude.

The state of Lantchian, though subject to Siam, pays a triennial tribute to Cochin China, and every 8 years sends a couple of elephants to China as a mark of submission.

Farther down the Mekhong is Chandapooree, called by the Shans Moungh-tchian or Wintchian. The city stands on both banks of the Mekhong, the name of Chandapooree properly belonging to that part on the east side of the river. This state was also tributary both to Siam and to Cochin China. About 30 years ago the Tsaubwa of Wintchian was inclined to throw off his allegiance to both countries, and proposed to the Zimmé states to enter into a confederacy. The Siamese attacked him with a large force, and utterly destroyed the town, treating the inhabitants with horrid cruelty, and removing most of the inhabitants, whom they located in the thinly populated tracts on the western branch of the Menam.*

This name of Wintchian is identified with Chandapooree by both Macleod and Richardson. Its identification, and the few particulars regarding it which I have derived from these travellers, are interesting, because they fix the place visited by the Dutch Envoys from Camboja in the 17th century, whose narrative is given in Valentyn's large history of the Dutch East Indies. They call the city to which they were deputed *Winkjan*, a name which appears to have puzzled Ritter, who supposes it to be intended for Kiang-Kheng.†

All the so-called cities of the Shan country, like the chief cities and provinces of Burma, have a classical or sacred name in Palee, besides the vernacular names by which they are known to the Shans and Burmese. Chandapooree is a case in point. Thus also Moné is called classically *Konandee*, Muang Lem is *Beik-karata*, Kiang-Tung *Khemarata*, Kiang-Hung *Zodinagara*, Kiang-Kheng *Thakalarata*, Zimmé *Nantapooree*, Labong *Harijunga*.‡

In the first volume of Duhalde's China § there is a curious

* "The Tsaubwa was kept, during the short time he survived, in an iron cage; with different instruments of torture alongside of him, and obliged to proclaim that the king of Siam was merciful, and his punishment deserved. Being an old man, his brutal enemies were not long gratified by the sight of his sufferings." ('Richardson's Journal of a Mission to Siam,' in J. A. S. B., ix. p. 249.)

† Erdkunde, iv. p. 1204. (1834.)

‡ By the help of a learned friend

Chandapooree = *Chandrapuri*,

Beik-karata = *Beiksharashtra*,

Khemarata = *Kshamarashtra*,

Zodinagara = *Dodinagara*,

Thakalarata = *Sakalarashtra*,

Nantapooree = *Anantapooree*?

Selenopolis.

The Realm of Saints (as it were).

Regio Felix.

City of Light.

Pantopolis?

City of the Infinite (Buddha)? or *Nandana-puri*, "Elysian city?"

§ English folio translation, p. 61.

account of the travels of certain Chinese from Siam to China, passing through the trans-Salweenic Shan states of which we have been speaking. By the light of Macleod's information this becomes much more intelligible than it was before. The chief cities on the way, they say, were Kyang-Hai; 7 days further Kyang Seng; 7 days more to Mohang Kemarat; 8 days to Mohang Leng which they call the capital city of Laos; 7 days more to Mohang Le; 11 days to Mohang-Meng, the chief city of another principality or province, and so on to Mohang Vinan which belonged to China.

The ruins of the fort of Kiang-Hai, with the remains of Pagodas and arched gateways, were seen by Macleod on his way from Zimmé to Kiang-Tung. It is said to have been the capital of the state before the foundation of Zimmé. Kiang Seng or Kiang Tsen, formerly an independent city, but now subject to Kiang-Tung, stands on the right bank of the Mekhong. It is laid down by Macleod, from information, about 50 miles to the N.E. of Kiang-Hai, which is probably too little, as he, leaving Kiang-Tsen far to the right, was 18 days from Kiang-Hai to Kiang Tung, whilst the Chinese were 7 days from K. Hai to K. Tsen, and the same time from K. Tsen to K. Tung. Mohang Kemarat is Kiang Tung under its classical name. Macleod's information made Muang-Lem (the Mohang-Leng of the Chinese travellers) 10 days from Kiang-Tung, which would maintain the previous proportion. Muang-Le is not known, but Mohang-Meng is doubtless the Maing-maing of the Burmese, one of the cities of the state called by them Kaingma-Maingmaing.

Muang Lem is spoken of by these travellers as in their time the capital of the *Lahos*. The wild Lawas we know are numerous within this territory, but the only civilized states to which the name of Laüs now seems to be applied by the Shans are those of Lantchian and Wintchian. The travellers also speak of mines of gold, silver, copper, and red sulphur, 5 days north of Muang Lem, especially of a silver-mine worked by Chinese. This is perhaps the Bau-dwen so much spoken of in Burma, though that I believe to be now within the territory of Kaingma. There are, however, it would appear, several silver mines in this region. It is also mentioned in the Chinese narrative that Muang Lem, or Laos, was then tributary to *Pumahang* or *Hawa* (Ava), and sent an ambassador annually to that court. They also speak of the tribute of gold and silver flowers, then, as now, sent from Khemarat or Kiang Tung.

Moang Vinan or Mohang Chay, of which the travellers speak as the termination of their route, is undoubtedly Yunnan. Indeed Captain Macleod, without any reference to this narrative, or apparent acquaintance with it, tells us that the city of Yunnan is

also called Vinnan by the Chinese, and that its Shan name is Muang Tsé Luang (meaning, I believe, *Great Muang-Tsé*).

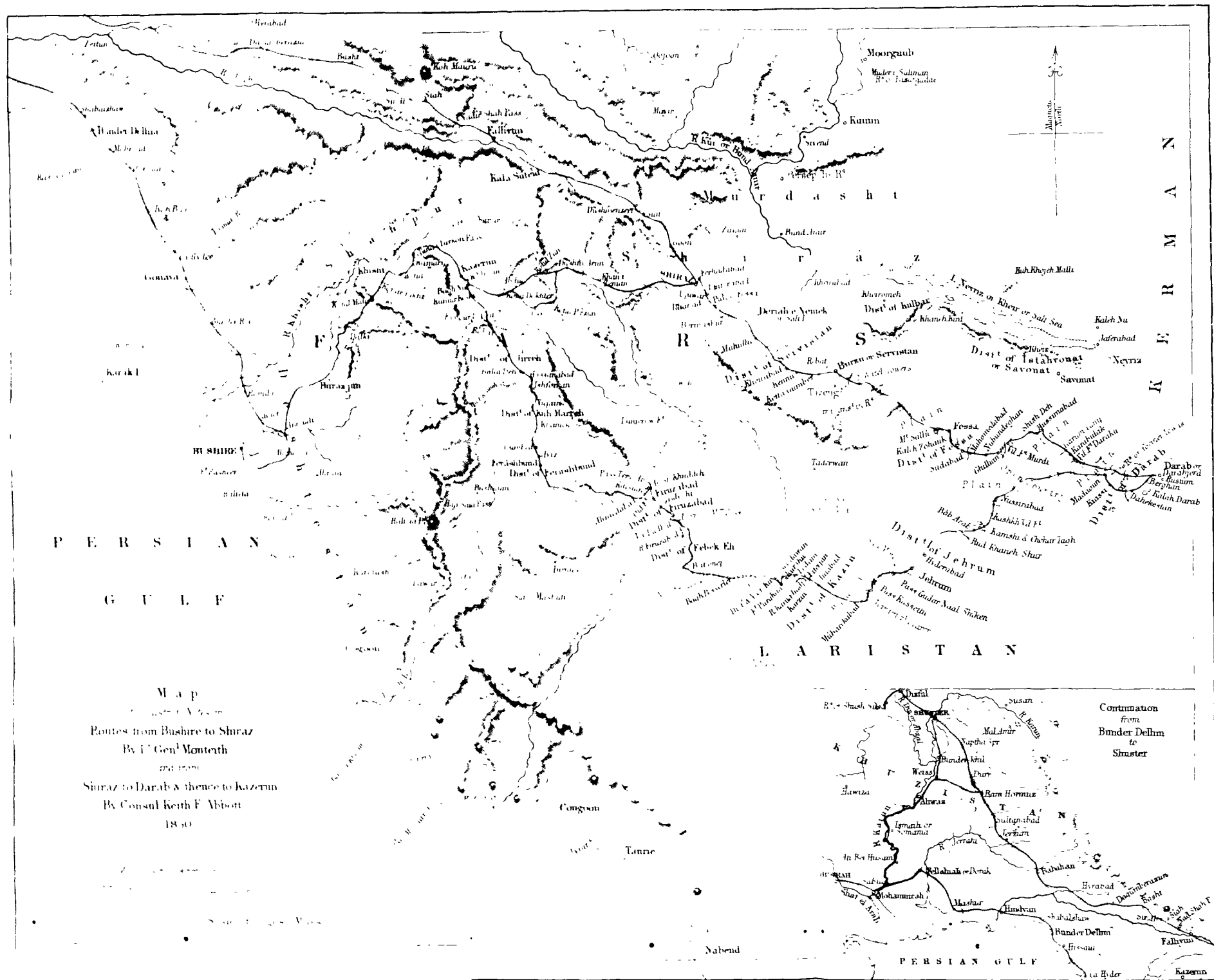
We see then that these provinces bore the same relation as at present to Ava at the time when these travellers wrote. What that time was, is not stated, but it must have been at latest the very beginning of the last century, and may probably have been a good deal earlier. Indeed in an inscription at the great temple of Koutng-mhoodau near Ava, dated 1650, partially translated by Colonel Burney, Kiang-Hung and Kiang-Tung are expressly mentioned as a part of the empire of Ava. They were probably subjected, along with the states of Kiang Mai or Zimmé, by the king Nyoung-Men-Tára, the restorer of the Ava Monarchy at the beginning of the 17th century, or by his immediate successors.

III.—*Notes on the Routes from Bushire to Shiráz, etc.* By Lt.-Gen. WILLIAM MONTEITH, Hon. E.I.C. Eng., F.R.G.S., &c.

Boul. February 9, 1857.

IN 1810, Lieut. M'Donald (afterwards Sir John M'Donald Kinneir) and myself were directed to proceed along the shores of the Persian Gulf to Bussorah. Our first stage was Rohilla, a small district containing ten or twelve Arab villages; the river here being within the influence of the tide is nearly as salt as the sea, but there are abundance of wells and much garden cultivation. Our journey lay over the same sandy plain with a low range of hills on the right as far as Bunder Reig, once the stronghold of the celebrated pirate Meer Mahura, who was the terror of the Gulf, and who even ventured to resist the power of Kerim Khan. When the place was taken he retired to Karak, from whence he was driven by the English fleet;* the fortifications of Bunder Reig were razed, since which time it has entirely fallen from its ancient importance, though it has continued to be the residence of the principal Arab Sheikh on the coast, after the Governor of Bushire. From this to Gunawa is 9 miles; here the ruins of a considerable town are visible standing about a mile from the sea; there is at present only a small Arab village on the spot, but it is supplied with numerous wells of good water. We passed through a range of low hills about 15 miles to Hissar, a collection of six or seven villages: the road is good, and the wells here also afford good water. Five miles farther is Mahmade, then six to Bunder

* He is said to have fired red-hot shot at our vessels twenty years before they were used at Gibraltar. He was ultimately executed at Grain by the Turkish authorities.



Map
of
Routes from Bishire to Shiraz
By Lt Genl Monteith
and 1870
Shiraz to Darab & thence to Kazeroon
By Consul Keith F. Abbott
1880

Delim, once a place of trade belonging to the Dutch, whose factory is still pointed out, but now only a miserable fishing village; the water is indifferent and at the distance of a mile from the town. Eight miles more brought us to Shabulshaw, an Arab fishing village; then 28 miles over a parched desert till we reached the town of Hindyan, situated on both banks of the river Tab, subject to the Sheikh of Chaub. The river under the influence of the tide is brackish, but is good some little distance up the stream; a number of large boats were lying near the town; the fort is on the western bank, and about a mile in circumference; 36 or 40 miles farther, along a road over a desert destitute of water or cultivation, brought us to Mashúr, a miserable town 2 miles from the sea. It is dangerous to traverse this plain during the hot winds, and mounds of sand were pointed out to us as the untimely graves of a body of travellers who had perished in one of the sand-storms frequently encountered there. The same desert continues to within 6 miles of Dorak, distant about 30 miles, after which we at once entered the swamps, extending to the walls of the Chaub capital. These swamps are not of a very remote date, and were occasioned by Sheikh Suleiman, the Prince of Chaub, having thrown the waters of the Jerahi over the country to arrest the progress of the Persian invasion under Kerim Khan. The Chaub fleet lay within the fort walls with only a few inches of water, but by turning the waters of the Jerráhi again into their former channel the vessels can be floated into the Persian Gulf; the dows were of the largest description, and might be from 250 to 300 tons burden. We descended a ditch through high reeds, passable only for one canoe at a time, to a point of the Karún 7 miles above Sabla; we descended the Karún 18 miles to Mohamrah, at the junction of the Shat el Arab, and the canal connecting it with the Karún, after which we proceeded up the river as far as Busrah.

We were now directed to explore the river as far as Shuster, and examine the country about Dizful and Shus (the ancient Susa). Descending the Shat el Arab to our former station at Mohamrah, we commenced the ascent of the Karún in a boat furnished by the sheikh, our horses and mules keeping on the western bank of the river, to avoid the numerous swamps and creeks on the eastern side. We put up at the ruined town of Sabla where there was not a single inhabitant; it is 18 miles from Mohamrah. The river here flows through a perfectly level country overgrown with brushwood to the tomb and ruined village of Ali Bel Husain. We were attacked at night by a party of Arabs belonging to the great tribe of Beni Lani, who carried off our best horse; the thief was shot in the river, but the horse crossed to the opposite bank and was not recovered till some

months afterwards, when he was sent to Mr. Manesty, our consul at Busrah. Twenty miles farther we passed the first inhabited village since we entered the river; it was small and merely built of mud, it was named Somania. From thence, 25 miles to Ahwáz, once a great city, but now almost ruined. We halted here two days to examine the ruins, and the stone dam thrown across the river, which is here 300 yards broad. Boats have great difficulty in getting through an opening in the bund, and the navigation to near Shuster would be greatly facilitated by the construction of a lock. The bund is a fine work and still perfect; it must, I think, have been constructed for the purpose of irrigation. We were surprised at finding a bridge of considerable size standing on the dry ground, and the remains of a large channel now nearly filled up; it is a circumstance that has given rise to much discussion, having been suffered to show either the existence of another river, or that the Karún once had another bed; we were, however, informed it had been made to divert the waters of the Karún while the bund was being constructed, and I think this a very likely explanation. This country once bore the name of Sugistan, or the country of sugar, but we could not discover the slightest trace of the sugar-cane having ever been cultivated there. The tradition is that the canes were all destroyed in one season by a grub, sent 'as a judgment upon the people for their wickedness and extortion. The city is said to be very ancient, and the assertion is borne out by the immense size of the stones used for the foundation of the citadel or palace, some of them being 6 feet long and 3 in height. We marched late to Weiss, a small village 13 miles from Ahwaz, and 10 more brought us to Bundi Khil, a walled village at the junction of the Karún and Abzal or Dizful river; it is an admirable military post commanding both rivers. The Karún ceases to be navigable 15 miles from this. From Bundi Khil to Shuster, the distance is 20 or 22 miles; the country is well cultivated, and the road difficult from the number of canals for irrigation and of rice-fields.

The town of Shuster was the summer capital of the Arsacian Kings, and was built after the ruin of Susa, its name signifying, better than Shus. It never, however, could have been one-tenth of the size of the more ancient city, even allowing the existence of an extensive suburb, which cannot now be traced. The walls are of stone, and the entrance is by a fortified castle and drawbridge. The town appears clean in comparison with other Asiatic cities, and many of the houses are two stories high, all built of stone. Canals appear to have been conducted from the Karún under the houses, to keep the Surdab cool; the walls are of stone but thin, and easily breached. The bund, which is attributed to Shapúr, but is probably of a much earlier date, is one of the finest struc-

tures that has ever been executed. It was repaired by Timor, and in 1810 by Mahomed Ali Mirza, by whose orders I examined it, and gave an estimate and plan for the repairs and alterations, recommending as little as possible of the latter, it being difficult to improve this splendid work. A bridge over the Karún consists of one arch 90 feet span and 70 high, and there is another of 32 arches over the canal.

The town of Dizful appears in a less ruinous condition than Shuster; it is at a distance of 36 miles, the road leading through a rich country with very few settled inhabitants, though much cultivation is carried on by the Illyats. We crossed the Abzal, here a broad and rapid but shallow stream, and after a march of 12 miles entered the ruins of Susa. I doubt if they are not more extensive and far more distinct than those of Babylon; the streets and the different quarters of the city can be distinctly traced. The only inhabitants were the family of a Syed residing in a building called the Tomb of Daniel. We had neither time nor means for examination, and were besides left in a state of constant alarm by some Arab marauders, who frequently reconnoitred our party, which consisted of 50 good horse, though the robbers did not venture to attack us; they are said to infest these ruins to the number of 200 or 300; and in addition to the *human* robbers, not a single beast could be trusted outside the enclosure of the tomb, for fear of the lions which are found in the neighbouring swamps. One of these animals was wounded but not captured, having disappeared among the reeds.

So large a party as ours could not find subsistence at this place unless previous arrangement had been made, so after the third day we returned to Dizful, and on the road we met a strong body of cavalry going in pursuit of the party we had seen in the ruins. We afterwards heard they had overtaken the robbers, about 20 of whom were killed and a very heavy fine was levied on the tribe. Mahomed Ali Mirza subsequently undertook an expedition into this part of the country, and brought both the Arabs and Loors into some degree of subjection.

We returned by the same route to Shuster, from whence our instructions directed us to proceed through the Mahomed Sennie country and Babahan to Shiraz, where General Malcolm's mission then was. The route we followed is supposed to be that by which Alexander marched to Persepolis, by descending the Karún as far as Weiss; the march across the desert, which extends from Shuster to the Vale of Ormuz, may be shortened about 20 miles, but we determined to take the whole extent, or from 90 to 100 miles, especially as there had been a very heavy fall of rain the day before we started (17th March). For 10 miles the road lies through low rocky broken hills, and just as we were quitting them,

we were attacked by a party of the Kara Gooslu (black eyed) tribe. At the first discharge of our fire-arms they fled; their chief was taken prisoner and carried by us to Shuster; but the governor did not dare to punish him. Matters were, however, accommodated by a proposal made by the robber-chief to conduct us across the desert to Ormuz, on condition of receiving a free pardon and a present of 100 rupees for himself and his men. As his people did not dare to enter the town, we accordingly, on the following day, went to the spot he had appointed for the rendezvous, where we found assembled about thirty most villainous-looking ruffians, and immediately set out, the chief having left his son as a hostage. We halted near a shallow pool of water formed by the heavy rain mentioned above, and felt great doubts of the chief being able to restrain his banditti, until a party of guards arrived from Shuster, and warned them that their families would be seized if they attempted any violence, or deserted us on the road; they also informed them that another chief had been secured. We now mounted, and at about the 50th mile halted at a spring much impregnated with naphtha, which was floating in white masses on the surface; we did not try the water, having found enough for our horses in a pool near at hand, where was also abundance of grass. After a march of 22 hours in the saddle, we reached the village of Durr, on a rapid stream, which lower down falls into the Jerráhí. The villagers said, that however willing they might be to assist us, it would not be in their power to defend us, should our escort, who had friends not far off, choose to attack us: they also warned us that the river would soon be impassable from the flood they hourly expected: it was, therefore, indispensable to push on, and, tired as were our cattle, we proceeded to the ruins of Ormuz, where there was still a stone enclosure. The proceedings of our late escort were now a matter of indifference to us: the chief himself had behaved well, and had told his men if they attempted anything against us, he would join our side with 10 of his own relations, and they might then try it, if they liked. I have no doubt he would have kept his word, and then, as our numbers would have been nearly equal, the result would certainly have been in our favour: they had likewise discovered that, with the exception of our horses, we had nothing of value with us.

The ruins of Ormuz are solid, though not very extensive: it is said to have been one of the most ancient cities in the world, and that emigrants from this place settled on the i-land of Ormuz, afterwards so celebrated for its commerce. The valley had belonged to the Sherkh of Chaub, but had recently been wrested from him by the Persian Government.* We made short marches

* There was a dispute between two brothers who had lands here: one, the day

the two following days, in order to allow our cattle to recover from their fatigue, passing through Sultanabad and Jerzún, rich villages surrounded by gardens. The road was good, but troublesome, from the numerous canals and rice-fields; the Jerráhi runs through its whole extent, which is about 30 miles. We then passed a low range of hills which separates the valley from the plain of Babahan, about 30 miles distant. The road is in some places stony, but offers no obstacle to carriage of any kind.

Babahan is a modern town, and may contain 10,000 people; it has nothing remarkable, and stands 3 miles from the river Jerráhi, which here issues from the mountains. From this, for 12 miles, the road lies over a fine plain to the banks of the Tab, which also comes here from the mountains, about 3 miles on our left hand. For 16 miles the road is excellent, after which it lies over a steep mountain and a rough defile, though one which would easily be made practicable for artillery. For 9 miles we crossed the hills, and then entered the small plain of Dagumberazún, surrounded by the high mountains of the Mahomed Senna, passing numerous ruined villages; it was 36 miles before we reached any that were inhabited.

For 20 miles we travelled through a narrow well wooded valley, to the small plain of Basht, when we descended a steep hill to the beautiful valley of Sir Ab Sea (the head of the Black water). We halted at the camp of Jaffier Khan, a Kajar chief, who had been chastising the turbulent tribe of the Mahomed Sennies, a number of whom he put to death, besides sending some prisoners to Shiraz. The road is not good, but is practicable for all kinds of carriage, or may easily be made so. After a journey of 12 miles through a valley, we arrived at the celebrated pass forced by Alexander; two high rocks, about 70 yards from each other, shut in the valley, through which runs a fine rivulet, leaving a clear passage of 50 yards. Alexander succeeded in gaining the heights from the rear during the night, and moved on without further impediment to the Kalá Sufeid (the White Fort), at the foot of which is a small Mahomed Sennie village called Falliyún. This rock or fortress is perpendicular on all sides, with a few ledges by which an expert climber might ascend; there is also a cut road along the face of the rock, defended by two towers and a gate. At the summit of the rock is a level plain about three-fourths of a mile square, the soil fine, and with numerous springs of water. Alexander's usual good fortune made him master of this apparently impregnable position, and it was also

of our arrival, said he knew his brother was an inhospitable brute, and had not received us as he ought,—we might now have our revenge as he was going to attack him, and proposed to us to join him. He returned at night with some plunder.

taken by Timor, by means of the Badukshan climbers, who followed the track of a wild goat. The road now becomes difficult, but there is only one steep ascent, as bad as any of the passes leading from Bushire to Shiráz: it is called the pass of Suereab; the mountain is thickly wooded, and capable of a good defence. From this we passed through a fine well-wooded but uncultivated valley to Dúshmenzeri, the first station, where we succeeded in obtaining barley since leaving Babahan; a good road leads from this to Shiráz, a distance of 20 miles.

Passes between Bushire and Shiráz.—It is much to be regretted that the excellent route-map made by the party under Sir Gore Ouseley, and also the route by Lieutenant Snodgrass through Ferúzabad, have disappeared and cannot now be found. The following observations were made by me in 1820 on my journey from Bushire to Tabriz, where I spent nearly a month in examining the passes and endeavouring to ascertain if there were no means of improving them without injury to the defences of the south of Persia, and I came to the conclusion that these barriers are more formidable in appearance than in reality. The islands of Karak and Korgo were on a former occasion occupied by the English, besides having been minutely surveyed by Captain Goodfellow, and plans furnished for a fort on Karak; they have also been so much frequented by the Indian navy that nothing more need be said by me. Both the Dutch and the Danes formed settlements there, but they have long been abandoned, and the place is now principally inhabited by fishermen and the families of the pilots who conduct ships from thence to Busrah. The extent of Karak is about 12 or 14 square miles, half of which is rocky and unfit for cultivation; on the other portion vegetables and some grain are produced, and the quantity might be greatly increased. There are many wells of good water, besides a small spring about the centre of the island, and this could easily be conducted to the anchorage which is said to be better than the roads at Bushire. Korgo is about half the size of Karak, and has a few wells, but in my time it was not inhabited and only occasionally frequented by fishermen from Karak.

The town of Bushire is situated on a peninsula, the side towards the sea standing on a range of low rocky ground; the creek or bay runs about 30 miles inland, and extends to within a few miles of Burazjün. There are some reservoirs within the walls, but the supply is totally insufficient for the inhabitants, and the water at the nearest wells, $1\frac{1}{2}$ mile from the town, is of indifferent quality. At the distance of 3 miles the water is better, but an ample supply can only be obtained at Ali-changi, a distance of 16 miles. The climate is healthy from October to April, though new arrivals are apt to be unpleasantly affected by the water. The heat in the summer

is excessive ; I have heard of the thermometer standing at 126° Fahrenheit. At Ali-changi, 16 miles from Bushire, water is good ; brushwood and some forage are also to be procured. The second crop of wheat and barley is reaped in November, but the country is but thinly inhabited ; the road to this place is sandy, and the plantations of date-trees begin to be numerous. From hence to Buraz-jún the road lies over a fine plain, with a few villages, and at the 6th mile it passes the dry bed of a torrent, where there is water in the winter and spring. Twelve miles farther on lies Buraz-jún, a large village, and the principal place of the district ; it has a fort with walls and towers of mud. Here both wood and forage can be got, and the date-palms are very numerous.

The road now approaches the mountains and is rather stony. The distance to Dalki is $13\frac{1}{2}$ miles. Here also both brushwood and forage can be got, and there is a spring of very clear water which, however, must be avoided, as it is impregnated with sulphur and naphtha, and occasions cramp in the stomach. It is very seducing to look at, but fortunately there is abundance of other water. The road now begins to be very rough and rocky ; it lies partly in the bed of a river, which is passed three times ; the third time there is a bridge in a very dilapidated condition ; it must, however, be crossed, as the stream sometimes contains a large body of water after rain, or the melting of the snows, and runs with great rapidity through a channel encumbered with rock.

The ascent of the mountains now commences, and for the first $1\frac{1}{2}$ mile is very steep and difficult. In forcing this pass it would be necessary to occupy the rocky heights on both sides. The pass is called the Kotul Malu, but it has several other names bestowed according to the fancy of the people. For about $\frac{1}{2}$ a mile the road is tolerably good, and it struck me that, by throwing a bridge of date-trees across and passing over from the right to the left side of the defile, a much easier path might be opened.

After travelling along the stony but cultivated valley of Rahdar for about five miles, I halted at the village of Konar Tukht, which is $14\frac{1}{2}$ miles from Dalki. The strong difficult ascent of the Kotul Kumari now commences, where only one mule can pass at a time. This is the strongest feature of the pass, and is about $2\frac{1}{2}$ miles in length ; it is for the purpose of avoiding this most difficult portion of the ascent that I would prefer crossing the ravine, on the other side of which there appeared to me to be a much more practicable road, and thence 9 miles farther on to Kumari ; this valley was once well cultivated. Boiling water gave the height of this spot 1400 feet above the level of Dalki, but the mountains on each side must be nearly 2000 feet above the valley. For 5 miles the road continues through this valley, after which it enters the celebrated pass of the Tung i Turkun

(defile of Turkun); the ordinary road descends the defile in the bed of a torrent, and for a distance of 3 miles is stony and narrow. There is, however, another road over the mountains which I passed on a former occasion, when I found it practicable for horsemen, though steep in some places. The mountains are here more accessible, and therefore offer less impediment to a force occupying the right and left of the pass, and the road down the ravine could easily be made practicable for artillery.

The road now enters the valley of Kazerún, once a considerable place, but much fallen into decay; a good house and fine orange grove still remaining, show what it once was. The valley abounds with forage and is said to be very healthy, except during the autumn. The nature of the vegetation now changes, assuming an European character. This valley leads into the country of the Mahomed Semmí, Lack and Loor tribes, who have seldom paid more than a nominal submission to Persia. It is said they can collect a body of 20,000 infantry and some cavalry; their country is exceedingly strong, with the celebrated hill fortress of the Kala Sufeid, which I visited in 1810. There are several rich and well wooded valleys, but they are left almost uncultivated by the wild and lawless people. These tribes extend along the mountains to the neighbourhood of Kermán, and are all disaffected towards the Kadjar dynasty. They afforded the main supporters of the Zend princes, and formed in fact their principal strength; Kerim Khán belonged to the Zend tribe, one of the 16 divisions of the Lúr race, who, with the Bukbares, extend from Kurdistan to Kermán. These tribes form a considerable portion of the population of Western Persia; they pay no taxes, but supply a certain number of men. The Persians have never been able to reduce them to obedience, and their irregular inroads into their country have only had the effect of rendering the population more prone to insurrection. They are great plunderers and wretchedly poor, although their country is capable of producing more than would supply their wants. Whether these men would answer to the call of the King of Persia is very doubtful, though they would probably assemble their men and watch the course of events; but anything like union among them can hardly be expected.

Should troops advance, a strong force must, under all circumstances, be stationed at Kazerún, and if the tribes saw a prospect of success, they would have no hesitation in taking part against the Persians, with a hope of again establishing a Zend or other Loor chief at Fars. A body of 3000 Bukbares, who were placed under Captain Hart, were remarkable for their submission and attachment to him, but they would not submit to the jurisdiction of any of the Persian officers; they are much given to desert and return in a body to their mountains.

From Kazerún the road is good, but stony for 9 miles, through the valley of the same name, when the pass of Kotul Dokhter (the Virgin's path) is reached. At the foot of the mountain there is a causeway across a creek of the Salt Lake, which is said to be deep, though narrow. The road has been carried by stone steps directly up the face of the mountain, with a few very abrupt zig-zags, and nothing can be more unpromising for baggage and artillery than the appearance of this passage. The road is said to have been constructed by a merchant, and appears to have been carried up the steepest face of the rock. I passed some time in searching for a more practicable route, and came to the conclusion that if another causeway or bridge were thrown across the creek, a tolerably easy road might be made about half a mile to the east of the present one, and then the hill, up which the present road is carried, would only require to be occupied by the flanking party in place of the high rocks to the west. On the east the hills are not so rocky and are much easier of access.

The ascent of this pass is not more than a mile, after which a much easier descent leads to the valley of Abdue, covered with oaks of the narrow-leaved species. I halted at the village of Abdue, 13 miles from Kazerún. The route lies through this valley, and is good for 7 miles, when the road commences to Kotal Zun (the old woman's pass). It is not so difficult as the Kotal Dokhter, and it would not be necessary to dismount artillery, though the guns would require the assistance of the soldiers to drag them up the steep ascent, a distance of about 3 miles. This is the highest of the three ranges; water boiled at 197° , giving an elevation of nearly 5000 feet. During the month of October the snow lay everywhere in patches, and in November the pass was covered with it; but the road is never allowed to become closed, being the great thoroughfare. The descent is only $1\frac{1}{2}$ mile to the plain of Dusht-i-Argin (lion's place), and the difference of elevation is probably not above 1000 feet. The centre of the small plain is very swampy, but there appeared to be abundance of forage and water; the cold here in winter is intense. The total distance from Abdue is 17 miles. At 1 mile the road quits the plain of Dusht-i-Argin, and for the next 10 miles passes through ranges of low hills, afterwards descending to a fine river coming from the Mahommed Sennie country. Here I halted at the caravanserai of Khan Zenian, the total distance being 12 miles.

From this point the route presents no greater difficulties than are usually encountered on Persian roads. Here and there it is obstructed by loose stones, but everywhere it is practicable for artillery. After pursuing the course of the river for 2 miles the road turns off and descends into the dry bed of a torrent, which is

crossed by a bridge at the distance of 20 miles. Six miles farther on lies Shiráz, surrounded by extensive suburbs and gardens.

Shiráz, the capital of Fars, has altered greatly during the last few years. The city has suffered much from earthquakes and other disasters, and still more from the oppression of the princes appointed its governors. It is difficult to estimate justly its population, but at the time of its greatest prosperity under Kerim Khán, it contained 10,000 houses, or nearly 50,000 inhabitants, while it hardly reckoned 20,000 souls when Sir John Malcolm was there in 1810. It 1812 it suffered greatly from an earthquake, which partly threw down the great bazaar, much shattered the walls, and nearly filled up the dry ditch. The walls of the town are 4 miles in circumference, and consist of a mixture of brick and mud, with towers and curtains. The Prince's Palace is of considerable extent, and surrounded by lofty walls. Not long after the earthquake there was a famine, occasioned by locusts, which destroyed the crops; it was followed, as usual, by epidemic sickness, but almost worse than all was the suffering caused by the grinding oppression of Hus-ain Ali Mirza, the son of Futteh Ali Shah. The troops were seldom assembled, to save the expense of their rations. On the list of the Dufter they stood at 18,000, of these about 2000 horse were in excellent order; they consisted of the yeomanry who served at their own expense; also about 500 Gholaums or guards. Since the accession of the present king, Fars has had to furnish about 5000 so-called regular infantry, but I never saw them, and they were organised by a Russian officer made prisoner near Erivan, and who settled at Shiraz. Some of the muskets were English, purloined from among those sent from India to the king, but the greater portion were made at Shiráz, and had very indifferent locks of the old Spanish form. It will be observed that the great force of the province of Fars consists of the ancient Persian tribes, and under a leader like Kerim Khán, a large army could soon be collected. Under existing circumstances, assembling them would be a dangerous experiment, as it might be doubtful which side they would take. Among these I do not include the Arabs of Deshtistan, who could hardly be induced to ascend the mountains, nor the semi-independent Sheikh of Choab Dorak, at the head of the Persian Gulf, who might, if so inclined, furnish 10,000 men. The great weakness of Persia consists in the disaffection of all but a few tribes immediately under the king. Nothing can be better than the Persian private soldier, or worse than the officers, either of high or low rank; they are generally taken from the worst class of the menial servants of the ministers and people about court.

Three miles to the north of Shiráz is the defile called Tung i

Turkún, leading to Zirgún and the plain of Persepolis. It is less strong than the passes between Bushire and Shiráz, and I believe has never been successfully defended. There is a gate and the remains of a wall, but it is only used as a police and custom-house station. There is another road from Bushire to Shiráz, which is said to be practicable for loaded camels; it was surveyed by Lieutenant Snodgrass by order of Sir Gore Ouseley; it is called the Firúzabad road, and is thus described.

From Bushire to Ahram, over the plain of the Deshtistan, 30 miles; road sandy, but otherwise good; water and forage favourable. Through the easy pass of Kalkhum 20 miles; water, forage, and brushwood abundant; population Arab; then through the pass of Hajji Salli to Bushgum, which is rocky and bad, 18 miles; to Birmey 35 miles; of tolerable road to Firúzabad 35 miles, from whence begins the descent of the mountains, the road very difficult. The plain is well cultivated as far as Zendanah, a distance of 22 miles, 4 miles being through a valley, the remaining 18 through a difficult pass. To Cowall 12 miles, road tolerable when it winds along the valley to the plain of Shiráz; distance 38 miles, road very good.

Distances measured by Perambulator from Bushire to Shiráz.

	Miles.	Furlongs.
Bushire to Ali Chengey	16	..
Burazjun	24	..
Dalki	13	6
Konar Tukht	14	..
Komarij	9	..
Kazerún	20	4
Abdue	13	4
Dusht Arjin	17	..
Khan Zenan	12	..
Shiráz	26	..
	<hr/> 165	<hr/> 6

By Firúzabad, estimated by time.

	Miles.
Bushire to Ahram	30
Kalkhum, or Kullema	20
Through Hajji Salli Pass to Bushgum	18
Birmey	35
Firúzabad	35
Zendana	22
Cowall	12
Shiráz	38
	<hr/> 210

IV.—*On the Determination of the River "Eulæus" of the Greek Historians.* By WM. KENNETT LOFTUS, Esq.

[For Map, see vol. xxvi. p. 131.]

Read, December 8, 1856.

PROFESSOR G. LONG has very correctly remarked* that "the whole question as to the site of Susa is inseparable from that of its rivers; the determination of the site of Susa determines the identity of the rivers, and if the identity of the rivers can be determined, the site of Susa is determined. But unfortunately," at that time, "there was almost equal difficulty in determining both one and the other."

Recently, however, one of these desiderata has been obtained.

In 1850, General Williams made certain discoveries in the ruins of Shûsh, near Dizfûl, in Western Persia; and, in the following year, the sum of 500*l.* was voted by Parliament, on the suggestion of Colonel Rawlinson, for the purpose of making further exploratory researches. At Colonel Rawlinson's request, I undertook to conduct the excavations. The remains of two ancient palaces were uncovered. One of these is a magnificent colonnade, erected on precisely the same plan and of the same dimensions as that at Persepolis. Upon the bases of the columns are trilingual, cuneiform inscriptions, cut by Artaxerxes Mnemon, which state that the edifice was commenced by his ancestor, Darius the son of Hystaspes. That the later monarch was the founder of Sûsa, we have the concurrent testimony of Pliny.† In the same ruins was discovered a short Greek epigram, in which appears the name of the province "Susiana." We may therefore conclude, without further doubt, that the ruins of Shush‡ represent the Susa of the Greek historians, and "Shushân the palace" of Scripture.§

This site being finally determined, it next becomes of importance to identify the various Susian rivers. This is, however, a difficult task, in consequence of the very remarkable discrepancies which occur in the ancient accounts concerning them.

The Journal of the Royal Geographical Society contains the opinions and explanations of several modern scholars and travellers upon this subject. These, for the most part, agree in correctly marking the modern Kerkhah as the Choaspes—the river of Diz as the Coprates—and the Kurân as the Pasitigris, but the course of the Eulæus, and the historical difficulties connected therewith, remain unsolved.

* Journal of the Royal Geographical Society, vol. iii. p. 258.

† Lib. vi. c. 27.

‡ A detailed account of my discoveries was read at a meeting of the Royal Society of Literature, and will appear in the forthcoming volume of that Society.

§ Esther i. 2, 5, &c.; Daniel viii. 2.

Mr. Layard * could find no ruins of sufficient importance at Súsán to justify their being considered as the palace of Esther, or even of their being assignable to so early a period. I can, from a personal visit to that locality, fully corroborate Mr. Layard's account.

Professor Long † and Mr. Layard † concur in believing that the Eulæus is represented by the small stream called Sháour or Shapûr, which flows close past the tomb of the Prophet Daniel at the western base of the great mound of Shúsh—the citadel of Susa. There are also objections to their view of the case; from the fact that—although deep—the tortuous course and narrowness of the Sháour are strongly opposed to the probability of its having been the great means of communication between Susa and the Persian Gulf,—especially when two large rivers, as the Kerkhah and that of Diz, are within two miles of the ruins.

The greater portion of the Shaour stream at the present day is—and in former times most probably was—expended in the cultivation of the soil. It is reduced to an insignificant rivulet before it joins the Diz.

It will not, moreover, correspond with the statement of Ptolemy ‡ that, after the Mosæus, the Eulæus was the chief river of Susiana,—nor will it clearly explain the conflicting accounts of the other ancient historians.

As it is upon the proper identity of the Eulæus that the apparent contradictions occur, I am induced to make a few notes, under the belief that a new and satisfactory light can now be thrown on the perplexing question. The solution here offered is founded on observations and information derived from a residence of three months at Susa. It proves that the early historians carefully registered what they saw, or what they transcribed from competent authorities, and that the apparent confusion in their statements arises—not from any fault of the writers—but from the difficulty of our comprehending them, owing to the very imperfect knowledge we possess of the countries they describe. Vast changes, moreover, have occurred in the courses of the various rivers during the many centuries which have elapsed since those accounts were written.

The explanation which I propose is this, viz.,—a bifurcation of the modern Kerkhah, one branch of which passed on the east of Susa, and eventually joined the Kurán at some undetermined point below Bender-ghil. Such a river would in every respect answer to the Eulæus, and meet all the historical difficulties of the case. We shall then understand—

* Journal of the Royal Geographical Society, vol. xii. p. 102; and vol. xvi. p. 61.

† *Ib.*, vol. xii. p. 102; and vol. xvi. p. 92.

‡ *Ib.* vi. c. 3.

I. That the name Choaspes properly applied to the western, while Eulæus referred to the eastern, branch of the divided river.

II. That, with two names for streams, derived from the same source, the parent stream was called indiscriminately by both. Hence, it is not surprising that the name of one branch was, in the same manner, loosely transferred to the other.

III. That the name Eulæus was also given to the united river formed by the eastern branch of the Choaspes or Eulæus and the Pasitigris.

I shall endeavour to prove that such a bifurcation of the Kerkhah did in former times actually exist: first, by extracts from and reference to the ancient writers; and, secondly, by my own actual observations in the locality.

I. As it is now universally admitted that the modern Kerkhah is the Choaspes of the ancients, I need only adduce the two following passages to prove that no other river can be referred to in them:—

“Alexander came to the Choaspes, and then entered Susa,” * on his march from Babylon.

“Susa stands in the interior on the Choaspes, on the farther side near the bridge.” †

It was on the banks of the Choaspes, so famous for the exquisite quality of its waters, that Abutites, the Persian governor of the province, according to Oriental custom, came to meet the conqueror with presents worthy of a king, and afterwards escorted him into the city. The present course of the Kerkhah corresponds with the Choaspes in the above passages, and, in fact, no other river will answer the description in connexion with the march of Alexander direct from Babylon to Susa.

In the quotation from Strabo there is a certain obscurity, which seems to imply that Susa was not situated actually upon the bank of the Choaspes, but only *near* it, which is the case at the present day with respect to the ruins of Shúsh and the Kerkhah. “On the farther side” may even refer to the eastern branch of the river.

II. To determine the Eulæus, we have a variety of apparently conflicting evidence, but which, when compared and digested, leads only to one conclusion. We have the statement of—

1. Pliny, ‡ that the Eulæus rises in Media.

2. Ptolemy, § that it has two sources: one in Media and the other in Susiana.

3. Arrian, || on the authority of Ptolemy and Aristobulus, that

* Q. Curtius, ii. 9.

† Strabo, p. 728: Casaub.

‡ Lib. vi. c. 27.

§ Lib. vi. c. 3.

|| Lib. vii. c. 7. 1.

“Alexander, who was at Susa, embarks and sails down the Eulæus; he then sails from the mouth of the Eulæus, along the gulf coast, to the mouth of the Tigris.”

4. Pliny* again, that the Eulæus surrounded the citadel of the Susians.

5. The prophet Daniel,† “I heard a man’s voice between the banks of the Ulai.”

The Median source of the Eulæus, referred to by Pliny, is, without doubt, the upper and mountainous course of the Kerkhah previous to its debouching in the fertile plains of Susiana.

The Susian source of Ptolemy is not, however, so plainly seen, but I take it to mean the point from which the bifurcation took place, and to apply to the eastern branch of the Kerkhah. As regards the passage from Arrian, modern authorities unanimously agree in identifying the lower part (at least) of the Kurán with the Eulæus, down which Alexander sailed to the Persian Gulf. But to sail from Susa implies the existence of some channel between that city and the Kurán, and we are, therefore, obliged to believe that the name Eulæus was likewise applied to the Diz, the Sháour, or to another river not now existing, which joined the Kurán. That this was not the Diz is evident from a passage in Diodorus Siculus,‡ to which I shall hereafter have to allude, wherein the Diz (ancient Coprates) is clearly distinguished from the Eulæus. It could not be the Sháour, on account of the reasons I have already given, and also from the fact that the water of the Eulæus was deemed so pure as to be the chosen drink of the Persian kings, which was carried with them on their journeys,§ while the water of the Sháour is notoriously heavy and unwholesome. We are, therefore, driven to the conclusion of there having been another navigable river, which a bifurcation from the Kerkhah would supply.

Ptolemy’s account, it must be admitted, is obscure. This is only to be expected from a writer who gives a geographical description of a country which he never visited. He places Susa upon the left branch of the Eulæus, upwards of a degree above the point of confluence of the right arm of the river.|| Obscure though this passage be, it, I think, affords material evidence in favour of my view of the case, for he distinctly alludes to two branches of the Eulæus. By the left branch I understand that which flowed east of the city. The western arm is the modern Kerkhah.

And here it should be remarked that, in speaking of the modern

* Lib. vi. c. 27.

† Lib. xix. c. 18, 19.

‡ Ptolemy, lib. vi. c. 3; and

† Chap. viii. ver. 16.

§ Pliny, lib. xxxi. c. 3.

Journal of Royal Geographical Society, vol. ix. p. 85.

Kerkhah throughout this paper, I do not imply that the course of this river was always the same as now. As related by Strabo,* it is probable that, in early times, it fell into the Kurán, or Pasitigris. Ptolemy fixes the source of the Susian arm of the Eulæus, *i. e.* the Kerkhah bifurcation, at $34^{\circ} 15'$, and the point of confluence at 33° , which gives a difference of latitude of $1^{\circ} 15'$. According to my friend Lieut. Glascott, R.N., the difference of latitude between Susa and Mohamrah, at the mouth of the Kurán, is $1^{\circ} 45'$. This appears to make Ptolemy's account correct as to the junction of the two streams of the Eulæus occurring upwards of a degree below Susa, or about 30 miles above Mohamrah. From Ptolemy I therefore conclude that Susa was situated between the two branches of the Eulæus, and that the eastern arm was the main stream; also that he entirely rejects the name Choaspes, which by other authors is applied to the western branch of the same river, now known as the Kerkhah. These points can, however, only be conceded on the explanation of the Eulæus bifurcation above Susa.

This once granted, we shall have the account of Ptolemy agreeing exactly with that of Pliny,† that “the Eulæus surrounded the citadel of the Susians;” and we shall be able to understand the apparent contradiction of Quintus Curtius (Rufus)‡ and of Strabo§ that Susa stood on the Choaspes, and also that remarkable expression of Daniel's “between the banks of the Ulai.” Susa would literally be surrounded by the waters of the Eulæus, yet at the same time stand on the Choaspes; Daniel from the palace might, as he states, have heard the voice “between the banks of the Ulai,” *i. e.* between the two streams of the Eulæus.

6. Strabo, in another passage,|| tells us that Alexander, in his march from Susa to Persis, crossed several rivers, which he enumerates apparently in order: “Next to the Choaspes is the Co-prates and the Pasitigris.” Now there is a clear contradiction here to his former account of Susa being on the east of the Choaspes, which river Alexander crossed on his way from Babylon to Susa. If, however, we admit the bifurcation of the Choaspes or Eulæus, the difficulty is at once explained. Alexander might cross the Choaspes on his way to and on his journey from Susa.

* Strabo, p. 728: Casaub.

† Lib. vi. c. 27.

‡ Lib. ii. c. 9.

In an Appendix to this paper I have given extracts from the Historians, and a tracing from the maps which illustrate Ptolemy's Geographical description of the region North of the Persian Gulf. If, instead of the eastern course of the Eulæus, we suppose it to have followed the smooth black lines, which I have inserted, we should have the two branches as assumed above. It is probable, however, that Ptolemy's eastern branch is the Kurán, and the western the Kerkhah, and that his account is really a confused one. But, as he makes the eastern branch rise in Mount Orontes, he more probably intends it for the Kerkhah.

§ Strabo, p. 728: Casaub.

|| Ib., p. 729: Casaub.

7. Pliny* says that the waters of the Eulæus and Choaspes were equally famed for their quality. This is to be inferred if they were derived from one and the same source; but Pliny was probably ignorant of the fact.

The next passage to which I refer is one from Diodorus Siculus,† which caused Colonel Rawlinson the chief difficulty in reconciling his theory of the Susian rivers.

8. "When Antigonus was marching against Eumenes, the latter retired to the Tigris, distant one day's journey from Susa. . . . Eumēnēs placed the Tigris between himself and his enemy, and lined the whole stream with his forces from its source to the sea. Antigonus, advancing from Susa, arrived at the Coprates, which rises in a mountainous country and flows into the Pasitigris: it is about 400 feet wide, and rapid. Antigonus having passed part of the troops over the river, Eumēnēs suddenly crosses the Tigris and attacks them. Antigonus retreats to Badaca on the Eulæus, and with difficulty makes his way through the country of the Cossæi, in nine days, to the inhabited part of Media."

Admitting the correctness of identifying the Tigris here mentioned with the Kurán, and allowing my theory to be correct as regards the Eulæus, the difficulty at once vanishes. We can, then, understand that when Antigonus was defeated on the Coprates, or river of Diz, he retreated upon the bifurcating eastern branch of the Kerkhah, or, at any rate, upon some river west of the Coprates to the position of which this bifurcating branch corresponds in a remarkable manner. With respect to the site of Badaca, I believe that it is to be recognised in some large ruins, the most prominent of which is named Tel Zembî,‡ which were observed and visited by General Williams and Mr. Churchill near the right bank of the Diz, and only a few hours south-east of Susa. It is not improbable that this site likewise represents the "templum Dianæ augustissimum illis gentibus," which Pliny§ marks as situated on the Eulæus below Susa, and which Antiochus Epiphanes || attempted to plunder.

Although of little or no importance in this inquiry, it may be well to observe that, if the Shour and the Diz, or the ancient Coprates, before joining the Kurán, as at the present day, had united their streams to the bifurcated branch of the Kerkhah, we should clearly have the Eulæus the chief river of Susiana after the Mosæus, which is now called Khor Mûsa, and which is one of the mouths of the Kurán. This would exactly agree with the testimony of Ptolemy previously mentioned.

* Lib. xxxi. c. 3; also Sol. Polyhist., xxxiii xxxviii.

† Lib. xix. c. 17.

‡ Mr. Churchill surveyed these ruins, and the Plans are now in the archives of the Turko-Persian Frontier Commission.

§ Lib. vi. c. 27.

|| 1 Maccab. c. vi. v. 1-4.

III. It would be useless here to repeat the evidence which proves that the Kurán was indiscriminately called Eulæus or Pasitigris. I will, however, notice one point of importance which has previously escaped observation. In Arrian we have the following passages :—

“Nearchus sails back past the outlet of the Tigris to the mouth of the Pasitigris, which he ascends till he comes to the bridge of boats by which Alexander was going to pass his army over to Susa.”—*Indica*, 42.

“The navy of Alexander sails from the Persian Gulf up to Susia. Alexander, who was then at Susa, embarks and sails down the Eulæus; he then sails from the mouth of the Eulæus along the Gulf coast to the mouth of the Tigris.”—*Expedit.* vii. 7, 1.

There is no question among geographers as to the identity of the Pasitigris and Eulæus here mentioned, but the cause of the discrepancy has not been explained. If, however, we suppose that the historian spoke of a river by the names which were more peculiarly applied to it at certain distant localities, we shall observe how very careful and correct these accounts really are. When speaking of Susa and its nearest navigable stream, he would naturally name the Eulæus, while at the mouth of the Pasitigris he would as surely speak of the river by that name. In like manner, at the present day, a person at Dizfûl would talk of descending the Diz river to the Tigris, while from the Tigris he would speak of ascending the Kurán.

Pliny states, in two passages,* that the Eulæus separated Susiana from Elymais, and also that it received into it the river Hedypnus, flowing from beyond the “Asylum Persarum,” and a second stream (Aduna?) from Susiana. Now the Eulæus, or eastern branch of the Kerkhah, and the lower portion of the Kurán or Pasitigris would exactly answer the above description, and separate Susiana from Elymais, or the region lying along the skirts of the great mountains, and extending to Persis on the sea coast. The Jerráhi† is admitted to have been the Hedyphon, on the assumption that it formerly joined the Kurán, therefore we are certainly at liberty to consider the Sháour, rising in Susiana, as Pliny’s second and inferior river. And thus it is proved that Pliny’s description of the Eulæus is in part applicable to the Kerkhah, and in part to the Kurán, for which apparent incongruity Prof Long‡ urges that “a better proof of the worthlessness of Pliny’s evidence could not well be produced”! It is now, I think, tolerably evident that Pliny’s authority was correct, and

* Lib. vi. c. 27.

† See Journal of Royal Geographical Society: Colonel Rawlinson, vol. ix. p. 92; Mr. Layard, vol. xvi. p. 91.

‡ Ib., vol. xii. p. 109.

that modern difficulties arose from ignorance of the changes which have occurred in the physical characters of the country.

It now only requires to be shown that there are positive traces existing of a channel which bifurcated from the Kerkhah above Susa, passed E. of that city, absorbed the Sháour, and ultimately joined the Kurán below the modern village of Benderghil.

From the left bank of the river Kerkhah, at a short distance below the ruined bridge called *Pai Púl*,* a dry channel of great width and depth strikes off in a south-easterly direction. It crosses the road between Dizfúl and the mounds of Shúsh, at about a mile or a mile and a half from the citadel at the latter place. From thence it continues in the same direction, and crosses the Sháour a little below the ford of Umm-et-timmen.†

It is to be regretted that I was unable to spare a few days from my labours at Shush to trace the onward course of this channel. On the conclusion of the excavations the intense heat (124° Fahr. in the shade) of a Susian summer caused me to dread being scorched to death like the lizards and serpents of the same locality in olden time.‡ Moreover other duties called me in the opposite direction, so that I was compelled to forego the pleasure and excitement which such an interesting occupation would have afforded me. In all probability, however, this river bed joins the Kurán near the town of Ahwáz, opposite to which place a deep channel has been observed by several travellers.

I do not, however, insist on this as the point of confluence, although I think it the most probable one. At two other places between Ismá'ili below Ahwáz and Náhr Háshem, the nearest point of the Kerkhah, I have, however, crossed deep and important river channels.

That the ancient watercourse passing E. of Susa was not simply an irrigating canal, is evident from the fact that it is sunk below the level of the desert. This is characteristic of all navigable streams in those regions. Irrigating canals, on the contrary, have their beds raised above the surface level, and are bounded on each side by high banks of earth, which is thrown out periodically in order to prevent the channel becoming choked up by the continual deposition of mud brought down by the stream.

I crossed the bed of this channel in several different places. The width is not less than 300 paces, while the depth often varies from 12 to 20 feet, even in its present condition. Numerous large irrigating canals, now dry, may be seen with their high embank-

* It is supposed that Alexander crossed the Kerkhah by this bridge on his journey from Babylon to Susa.

† This ford is 12 or 14 miles south-east of Susa. I regret that I am unable to lay down the positions on a larger scale, as my road-books are at Constantinople.

‡ Strabo, lib. xv. c. 3.

ments diverging from it on either side; these prove it to have been a trunk stream of considerable importance. In confirmation of my belief that it was the Eulæus, the Arabs of the locality have a vague tradition that an ancient river ("shat atîque") flowed in that direction, and a small canal, called Mahmûdiya, at this day conveys water from the Kerkhah along the ancient bed for the irrigation of the land E. of the mounds of Susa! This is the last watercourse crossed between Dizfûl and the ruins.

The bifurcation of rivers is by no means of uncommon occurrence in the country under discussion, and we need, therefore, feel the less hesitation in adopting this method of explanation as regards the Eulæus.

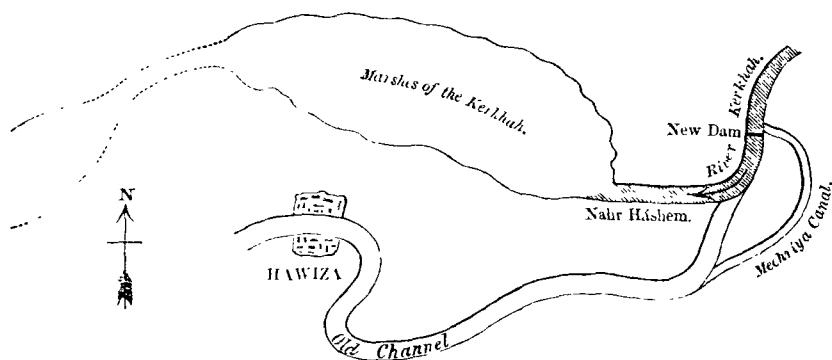
At Shûster, within 35 miles of Susa, we have an instance of bifurcation which offers some analogy to the point in question. The stream of the river Kurân is here divided into two parts. The main portion flows along the western and original channel, while the smaller portion is conveyed by a deeply-cut artificial channel on the east to the village of Bender-ghil, a distance of 30 miles, where it again unites with the main stream. The western channel is called the Shuteyt, and the canal is named Ab-i-Gargâr, as is evident to any person who will carefully examine the two streams. Owing, however, to the obscurity of the Arab geographers, and to the mistakes of some modern travellers, as much difficulty and confusion occurred in the application of the correct names to these streams as in the determination of the Eulæus itself. It was not until Col. Rawlinson entered into a full explanation* that the difficulty was cleared up. At the mouth of the Ab-i-Gargâr, a substantial dam of stone called Bendi Shâhzâda, with openings left for the passage of a certain quantity of water, restrains the Kurân from taking the course of the canal in preference to its natural channel.

Again, at Ahwâz, about 25 miles below Bender-ghil, on the same river Kurân, a natural ridge of sandstone rocks crosses the stream. This natural obstruction has, at some some time or other, been artificially increased by building walls for the purpose of dividing the stream, so as to irrigate the plains on the east by means of a branch of the river. Through want of care a part of this dam has been forced away, and the stream has again resumed its former course, and the newer channel is once more dry.

A third and still more remarkable instance of bifurcation occurred in the Kerkhah itself, about 40 miles on the south of Susa. Previously to 1835 the river flowed past the large and important Arab town of Hâwîza. For the irrigation of the country on the right bank, a person named Hâshem dug a small canal about 15 miles

* Journal of the Royal Geographical Society, vol. ix p. 74. See also vol. xvi. p. 27, for Mr. Layard's account of the Kurân.

above the town. The level of the irrigated tract being considerably lower than had been calculated on, and the soil at the mouth of the canal exceedingly soft and yielding, it became necessary to build a bund at the point of bifurcation to prevent the river abandoning its own course. The bund subsequently gave way, and the mouth of the Náhr Háshem was considerably enlarged.



Another and much stronger dam was afterwards erected, but this, during an extraordinary rise of the Kerkhah in the spring of the year mentioned, was bodily carried away, and the whole torrent of the river, forsaking its natural course, flowed into the Náhr Háshem, and converted the low land on the north of Hawiza into a vast marsh. The consequence to the town was, that during a single night the river had disappeared, and water is now only to be obtained by digging wells in the old river bed. Several governors of Khuzistán have set about affording a remedy to this disaster, but the "fostering care" of the Persian government has never allowed the plan to be carried fully into effect! A new canal was dug above and opposite to the Náhr Háshem, and was called the Mechriya. It is intended to divert the course of the river by its means into the original channel, and a bund has been partially thrown across the Kerkhah for this purpose, but, either from want of funds, jealousy, or inability, this plan is not likely to be realized. In 1852, Prince Khánler, the present Sháh's uncle, spent a considerable sum on the work, and had nearly completed the dam, when an unexpected rise of the stream utterly demolished it. I am not aware if it has been since recommenced.

That the bifurcation of the Eulæus from the Choaspes was effected by means of a similar bund or dam thrown across the main stream, it is my firm opinion; and there are equal grounds for presuming that, by the breaking of the bund, a catastrophe occurred at Susa, with regard to the Eulæus, precisely resembling

that which I have above described as depriving Hâwîza of the river Kerkhah.

It is, of course, impossible to state at what time after Alexander the Eulæus became dry, but it is not unreasonable to suppose that this event may have accelerated the fall of Susa, and given an impetus to the rise and importance of her new rival Shûster in the early ages of the Sassanians.

It may be objected to many of the conclusions arrived at in this paper, that they are based on the belief that the extinct channel, which I take to be the Eulæus, joins the Kurân. If, however, it be considered that there is a native tradition as to the existence of an ancient river in the same channel, and that such channel corroborates and explains the otherwise conflicting testimony of the early geographers, it is not, I submit, unreasonable to connect these facts, and to acknowledge that there is, at least, strong circumstantial evidence in favour of the conclusions I have deduced from them.

In once more opening the subject of the Eulæus controversy, after all the arguments which have been already so learnedly advanced, I have done so under the impression that any new matter bearing on the question is of value. It is to be hoped that the attention of future travellers in Susiana may be attracted to the subject, and that they may be induced to trace the extinct river, from its origin at Pau Pûl on the Kerkhah, to its supposed termination on the Kurân, which circumstances prevented my accomplishing. If this can be satisfactorily effected, we shall have overcome a difficult point in the study of ancient geography, and rescued the veracity of the ancient historians from unmerited obloquy.

APPENDIX.

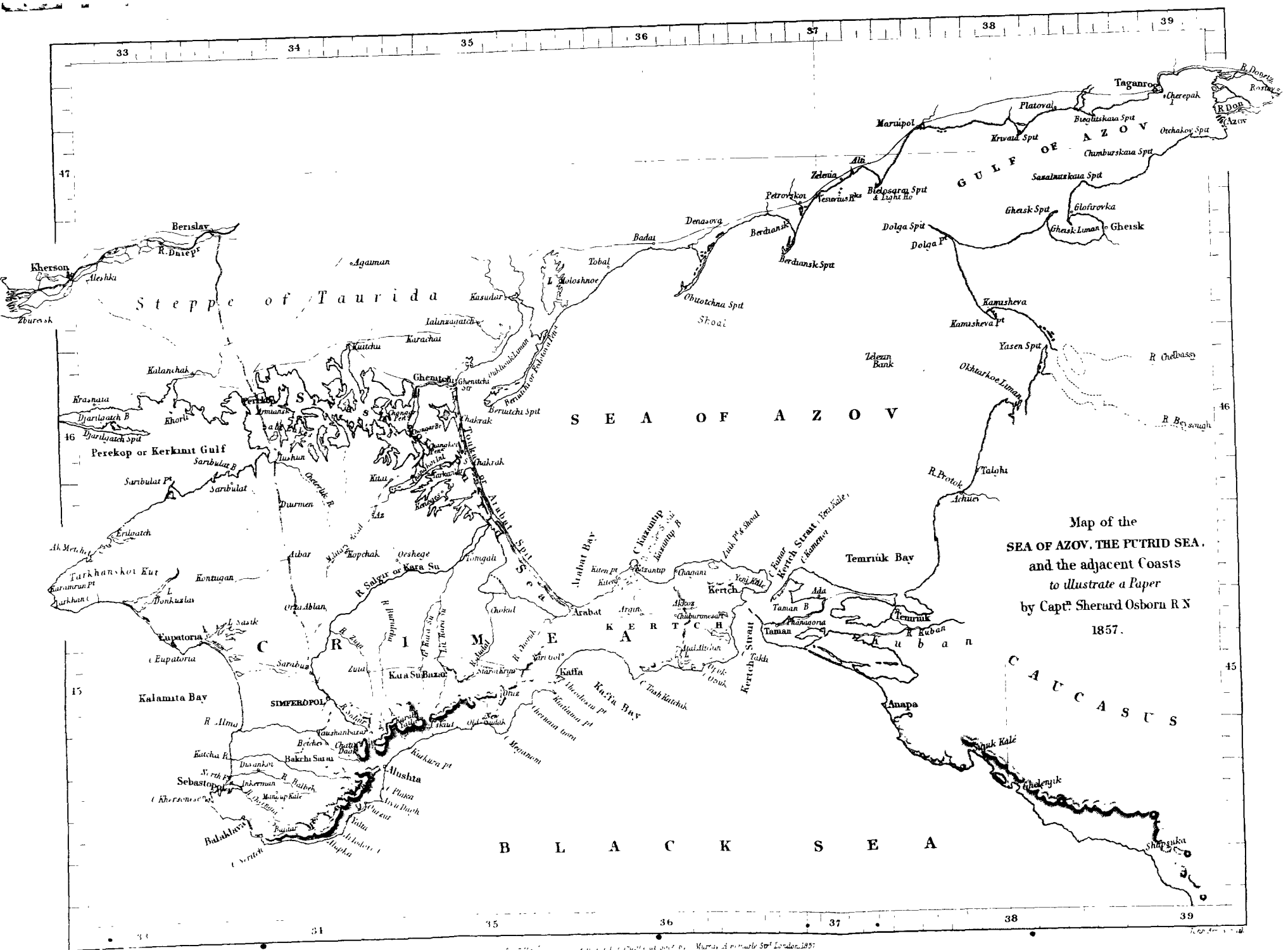
Extracts from the Historians referred to in the Memoir.

ARRIAN, *Expedition Alexandri*, vii. 7 :—

Ἀλέξανδρος δὲ τῆς μὲν περὶ στρατιᾶς τὴν πολλὴν Ἑφαιστίωνα ἄγειν ἐκέλευεν ἔστε ἐπὶ τὴν θάλασσαν τὴν Περσικὴν· αὐτὸς δὲ, ἀναπλεύσαντας αὐτῷ τοῦ ναυτικοῦ ἐς τὴν Σουσίαν γῆν, ἐπιβάς τῶν νεῶν ξὺν τοῖς ὑπασισταῖς τε καὶ τῷ ἀγῆματι, καὶ τῶν ἱππέων τῶν ἐταίρων ἀναβιβασάμενος οὐ πολλοὺς, κατέπλει κατὰ τὸν Εὐλαῖον ποταμὸν ὡς ἐπὶ θάλασσαν. Ἦδη δὲ πλησίον ὧν τῆς ἐκβολῆς τῆς ἐς τὸν πόντον, τὰς μὲν πλείονάς τε καὶ πεπονηκυῖας τῶν νεῶν καταλείπει αὐτοῦ· αὐτὸς δὲ ταῖς μάλιστα ταχυναυτούσας παρέπλει ἀπὸ τοῦ Εὐλαίου ποταμοῦ κατὰ τὴν θάλασσαν, ὡς ἐπὶ τὰς ἐκβολὰς τοῦ Τίγρητος. Αἱ δὲ ἄλλαι αὐτῷ νῆες ἀνακομισθεῖσαι κατὰ τὸν Εὐλαῖον ἔστ' ἐπὶ τὴν διώρυχα, ἣ τέτμηται ἐκ τοῦ Τίγρητος ἐς τὸν Εὐλαῖον, ταύτῃ διεκομίσθησαν ἐς τὸν Τίγρητα.

* * * * *

Ἀλέξανδρος δὲ περὶ πλεῦσας κατὰ τὴν θάλασσαν, ὅσον μεταξύ τοῦ τε Εὐλαίου ποτα-



Alexandri Pasitigri, vicus ad lacum Chaldaicum vocatur Aphle: unde Susa navigatione LXVMD passuum absunt.

* * *

Susianem ab Elymaide disternit amnis Eulæus, ortus in Medis, modicoque spatio cuniculo conditus, hac rursus exortus, et per Mesabatenen lapsus, circuit arcem Susorum, ac Dianæ templum augustissimum illis gentibus, et ipse in magnâ cærimoniâ. Siquidem reges non ex alio bibunt, et ob id in longinquâ portant. Recepit amnem Hedypnum, præter Asylum Persarum venientem, Adunam ex Susianis.

* * *

Infra Eulæum Elymais est, in ora juncta Persidi, a flumine Oroati ad Characem, CCXL mill. passuum.

PLINY, xxxi. 3 :—

Parthorum reges ex Choaspe et Eulæo tantum bibunt: et cæ quamvis in longinquâ comitatur illos. Et horum placere potum, non quia sint amnes, adparet: quoniam nec è Tigri, nec Euphrate, nec è multis aliis bibunt.

PTOLEMÆUS, lib. vi. :—

Susianæ situs, cap. iii.

Mosæi flu. ostia	..	..	..	..	82	:	30	40
Fontes fluvii	..	..	..	..	82	30 :	33	0
Eulæi flu. ostia	..	..	..	..	84	33 :	30	40
Fontes fl. in Susianâ	..	..	..	..	83	:	35	0
Fontes fl. in Mediâ	..	..	..	..	86	:	38	0
Conjunctio fontium	..	..	..	..	84	:	33	0
Oroatidis flu. ostia	..	..	..	..	86	30 :	30	30
Fontes fluvii	..	..	..	..	88	30 :	34	40
Susa	..	..	..	..	84	:	34	15

QUINTUS CURTIUS (RUFUS), ii. 9 :—

Jamque Susa ei adituro Abulites, regionis ejus præfectus, sive Darei jussu, ut Alexandrum præda retineret, sive suâ sponte, filium obviam misit, traditurum se urbem promittens. Benigne juvenem excepit rex, et eodem duce ad Choaspin amnem pervenit, delicatam, ut fama est, vehementem aquam. Hic Abulites cum donis regalis opulentiae occurrit.

V.—*On the Geography of the Sea of Azov, the Putrid Sea, and adjacent Coasts, &c.* By Capt. SHERARD OSBORN, R.N., C.B., F.R.G.S., &c.

Revol. February 23, 1857.

UNDER the above uncomplimentary name is known the extensive series of shallow lagoons and marshes which wash the major portion of the north-east face of the Crimean Peninsula, and which doubtless at one time formed a portion of the sea of Azov, or, perhaps, more correctly speaking in those distant periods when it was better known as the “Palus Mæotis.”*

* See chapter on Spit of Arabat.

At the time of the Russian invasion of the Crimea under Marshal Lacy in 1736-37, that portion of the Sivash which lies westward of the Chongar Peninsula was called the River Chongar*—a nomenclature which has been departed from in modern charts without any sufficient cause, for it decidedly partakes far more of the character of a river draining the Crimean and Tauridian steppe, which borders it, than it does of that of a sea.

Of the above portion of the Sivash we shall not presume to speak, no English naval officer having visited it during the late operations, and the information gleaned of the Russians being of that vague condemnatory nature that justified one in believing that they might be as incorrect in their opinions and inferences as to its character and the insalubrity of its shores as they appeared to be ill-informed of the capabilities and physical character of that portion of the Sivash which extends from Ghenitchi to Arabat.

The geographical contour of the Sivash, eastward of the point where the Chongar and Changkoi Peninsulas nearly meet (and are actually connected by a long causeway and a bridge), is that of which we will speak.

This portion is nearly 70 miles long, in a N.N.W. and S.S.E. direction, and varies in breadth from 20 miles to as little as 4. The eastern and northern sides of this area are but slightly indented or irregular, but the western, or Crimean shore, contains long indentations of a peculiar character which run into the steppe for distances varying from 10 to 15 miles in about a S.45°W. direction. These indentations are known to the Tartar inhabitants of the steppe by the names of the promontories which separate them, and they again are called after that of the most important villages situated upon them. For instance—Changkoi, Tarkanrar, and Biúk Keneges give titles to the points on which they stand and the inlets to the S. of them.

Around these indentations, as well as throughout the whole coast of this Sivash, bordered by the steppe of the Crimea and Taurida, commencing at Arabat and passing north-westerly towards Chongar and Ghenitchi, the shore, with few exceptions, is an abrupt wall of earth, marl, or clay, in short, the edge of the steppe, as fresh-looking and as escarped, as if Time had laid no finger on it since the creation. The height of this abrupt cliff varies from 5 to 20 feet, except at the delta formed by the discharge of the Salgir and Kara-Su rivers, in about lat. 45° 35' N, where a low and sloping shore exists.

The eastern shores of the Sivash, along the Arabat Spit, are

* The *Memoirs of Russia*, by General Marestein, of which an admirable English version has lately been published by our learned countryman, the Herefordshire Incumbent, is my authority upon this point.—See pages 178-9, vol. i.

merely those of a sandbank, except at the two isolated fragments of steppe land,* which exist upon the spit, where a steep wall of earth is again found on the side of the Sivash.

These two solitary fragments of steppe, which exist on Arabat Spit, are very remarkable, and, until a better name be found for them, we will for distinction sake speak of them by the term applied generally by the English navigators in 1855, "North Chakrak" and "South Chakrak" (Chakrak being a term used by Tartars when speaking of them).

Both these "Chakraks" throw off, on their western base, an extensive series of mud and gravel banks, which separate as it were the Sivash into three almost distinct basins. The northern basin is of an oblong form, of which the sides are barely 10 miles in extent, and comprised between Ghenitchi, Chongar, and the (east and west) axis of the Northern Chakrak; it contains a superficial area of about 60 square miles of water and marsh.

The Russians have lately asserted, and it has been repeated by people whose statements are deserving of all respect, that a depth of water, equal to 9 English feet, leads through this northern basin, from the straits of Ghenitchi to those of Chongar. If this should be the case, it seems likely to have been only very lately discovered, for, in May, 1855, when Ghenitchi was attacked by the allied squadron, numbers of small vessels, drawing far less water than 9 feet, were discharging military stores at that place, to be conveyed by a circuitous land carriage, over the strait of Chongar, into the Crimea; whereas, according to this information, those very vessels should have landed their cargoes on the Peninsula of Changkoi, far beyond the reach of our attack. Still more strange is it, that although we destroyed some 80 sail of vessels in Ghenitchi, and in the hurry left 14 untouched, that the Russian authorities, after removing their masts and lightening them to their utmost, should not have moored them out of range of our guns. Indeed, the furthest of these remaining 14 vessels, after every effort to save her had been made, was repeatedly hulled by the Lancaster gun of H. M.'s gun vessel 'Wrangler,' Commander Hugh Burgoyne, and was at that time within 5000 yards of the Sea of Azov.

The northern basin of the Sivash includes the only outlet which exists for the superabundant waters of a sea which drains two-thirds of the Crimean peninsula. On the eastern entrance of the strait a sand-bar has been formed, sweeping with a curve into Oukliouk Liman; over its centre a short, narrow, and tortuous channel existed in 1855, for it is necessary to mention dates when speaking of sand-banks, as they may vary much, especially

* See the description of these given under the head of Arabat Spit.

when, as in the case I speak of, the bank is evidently formed by the deposit of the Sivash current and counter-currents of the Azov. The water on the bar, under favourable circumstances, such as a perfect calm in both seas, stood at about six feet vertical depth, but increased a foot or decreased two feet with astonishing rapidity when the wind freshened from the east or from the west.

Directly the bar was crossed, a narrow gully of water, containing 10 feet, was entered, which led up for the narrowest point of the strait, between the spit on the southern hand and a low projection from the steppe on the other. This gully of water was very narrow, perhaps as little as 150 feet across, bounded on either side by an abrupt mud-bank covered by a few inches of water. Except with a leading wind, vessels must be tracked or towed through this channel, into what has been dignified with the name of the harbour of Ghenitchi, or, in Russian nomenclature, "Ghenitchesk."

Directly the narrowest part of this strait is passed, and it is there as much as 15 English feet deep, the channel forks into two branches—one leading about w.s.w. or s.w., and the other veering north.

The north channel forms the harbour, and preserves some depth for about a quarter of a mile, after which it shoals so much, that we repeatedly saw the Cossack horse fording it, and only skiffs of the lightest description were ever seen passing by it, through the marshes, into the open water 3 miles farther on.

Within that quarter of a mile, and under the eastern face of Ghenitchi point, nearly all the Russian transports were found crowded together by us in May, 1855.

The western and south-western channel is evidently the true one; it was strangely tortuous, and, judging by the extent to which some of the wrecks were submerged in it, we should say it varied from 4 feet to 7 feet in depth. After leading through a belt of reed and grass-grown morasses, averaging about 3 miles in width (in an east and west direction), this channel evidently opened into the water space of the north basin.

In that water space, like every other portion of the Sivash seen by us, where devoid of reeds, was clear, blue, and sparkling, as if the depth of its waters equalled that of the Atlantic. On it, after all communication for the Russians ceased along the Spit of Arabat, and in the Sea of Azov, we observed small boats to be often plying between Chongar peninsula, and an extempore pier erected on the eastern edge of the marshes, three miles beyond Ghenitchi.

The deepest water in the northern basin flows from the landing-place alluded to, with a gentle curve towards the Peninsula of

Tchougar, and then follows along its shore to the narrow passage between it and Changkoi Peninsula.

In it the water varies from 8 ft. to 4 ft. 6 in., the fluctuations of depth my informants told me being so sudden that the Russians had never been able to use it for navigable purposes, and throughout the fall of the year 1854, and early part of 1855, until the allied admirals (Sir Edmund Lyons and Admiral Bruat) crushed the Russian sea-transport, the enemy used to draw their supplies from the regions watered by the Volga, Don, &c., by carrying everything to Ghenitchi, disembarking it there, and thence, by land transport, down the Tchougar Peninsula, into the Crimea. Ghenitchi is the only town standing on the space alluded to; it became very important during the war, as the great military depôt for corn, rye, and fish, consumed by the enormous Russian armies poured into, and buried in the Crimea. The better portion of the town consisted of houses built on the edge of the steppe, the church, government-offices, with their green roofs, and some of those belonging to the better class of residents, running in a couple of streets in an east and west direction, and overlooking the strait. The steppe, however, throws out a few hundred yards of low land at its base, and on that flat, as well as swarming up the face of the steep acclivity, were the dingy-looking abodes of the mass of the population, the majority of them of Greek descent. Apart from occupations connected with the war, the inhabitants of Ghenitchi were largely engaged in the salt-trade, an important branch of commerce in Southern Russia, and in the curing and sale of fish, an article of enormous consumption in the dominions of the Czar. The direct route for Kertch, and Kaffa, and the Kuban district, lies down the Arabat Spit, and the postal service, through Ghenitchi, renders it a point of passage for travellers, and the writer was assured at Odessa, that persons going to Kertch, even from that part of Russia, preferred the Arabat Spit road to that through Perekop, and across the Crimean steppe.

The salt of Ghenitchi is mainly drawn from the salines on Arabat Spit, those of the Northern Chakrak being the most important. Trains of arabas, each perhaps capable of carrying 15 cwt. of salt, dragged by two oxen, make their slow and toilsome way to, and from the interior of Russia, to supply the inhabitants with this necessary of life. The Russian government, to encourage the native manufacture of salt, have prohibited the importation of salt in the ports of the Black Sea and the Sea of Azov; but nature, and a hot sun, seem to have done far more for the production of salt in the salines of the Sivash than Muscovite commercial enterprise. This subject, as well as that of the

fisheries, will be treated of hereafter, under the head of Commerce of the Sea of Azov.

The northern basin of the Sivash is divided from the southern one by a central area, which bears far more, in its usual aspect, that morass-like character, which the general reader would be inclined to impute to the term Putrid Sea. It extends from the centre of the "North Chakrak" to the southern edge of the "South Chakrak." It is of an oblong form, about 13 miles long and 8 miles wide, including the inlet of Changkoi. With the exception of the channel leading up to Chongar-bridge, which skirts the steppe, and a similar one, with 4 ft. 6 in. water in it, which communicates with the southern basin, the whole of this area is a great series of mud-banks, covered with weeds and reeds, intersected here and there with gullies of water, having no outlet, and for miles in the deepest places, under favourable circumstances, we found only a foot or six inches water covering the mud and gravelly bottom. The inlet of Changkoi is equally shallow, and we crossed it twice, finding less than a foot of water in July, but a very short distance within its entrance. In this solitude, breed vast numbers of wild fowl, and all the summer long we found Muscovy ducks and flocks of divers frequenting the lagoons. In the early spring, or during the autumnal rains, the waters thrown off the Crimean steppe and mountains flood the marshes of this great quagmire; but in the summer, the heat of the sun, and the paucity of the water render it little else than a great salt-pan—or saline.

The rapid evaporation, and the extraordinary mirage from the heated atmosphere playing over the surface of this area in a summer's day, was very striking, and between sunrise and sunset, at that season of the year, it was as utterly impossible to distinguish objects but a mile or so distant upon it, as it would be had a cauldron of boiling liquid been there in its place. There are roads through these morasses, only known, however, to the Tartars and smugglers, who are ever at war with Russian custom-houses and tax-gatherers.

The Crimean side of this area is a steppe, but from the quantity of hay it yielded to the Russian cavalry, it decidedly could not be called a barren one. The edge of this steppe is, about Changkoi and Chongar, not more than 20 feet vertical height; we easily scaled it by means of a ladder formed of the masts of our boats. The channel about Changkoi, and across to Chongar, is deepest at about 150 to 200 yards off-shore, but ridges of mud and gravel, covered with heavy weeds, showed the action of occasional violent freshets from the space to the westward. In landing at both these peninsulas, indeed all round this Sivash, the boats of

lightest draft have to be dragged through a fat and stinking mud or sludge for fully 100 yards, and, at the base of the steppe, a narrow belt of clay afforded, in most places, just room enough for a boat to be dragged out high and dry.

At the point where the Changkoi and Chongar peninsulas approach each other most, embankments have been thrown out over the shallows, and a wooden bridge connects the Russian and Crimean shores. The effect of these embankments is naturally to increase the force of the current under the centre of the bridge, and, consequently, deepen the water in that locality by its action upon the mud. The natural contraction of the channel, however, in this neighbourhood, rendered it necessary to bridge the intervening space, and, subsequent to 1737, when Marshal Lacy retreated out of the Crimea by a temporary bridge thrown over this spot, the Russians constructed a very rough one, which was principally used by the waggons or arabas in the transport of salt into Russia Proper. After the commencement of the late war, and the fall of Eupatoria to the allies, the route from Perekop to Sebastopol and Simpheropol was so exposed to the forays of enterprising or active bodies of cavalry, that the Russians turned their attention to the development of the Chongar route. Wood for piles was transported from the Don, and from Kherson on the Dnieper, and other measures taken to increase the capabilities of the bridge—and, until the Russians discovered that no serious attack was made on the main route of their communications *viâ* Perekop, much attention was directed to that *viâ* Chongar.

In reply to queries as to whether the Tartar or Cossack inhabitants of the shores of this central area ever crossed by fording it on horseback, our informants stated that it was considered highly dangerous on account of the mud holes, into which horse and man might be plunged beyond all hope of being saved. In 1855, however, some Cossack horse, panic-stricken, did wade across from the marshes of the Northern Chakrak to Chongar Peninsula; it was considered a great feat by the Russians, though we could not accuse ourselves of ever having been the cause of their alarm or gallantry.

The southern portion of the Sivash is that to which we will now turn. It is about 40 miles long, commencing at the Southern Chakrak and ending at Fort Arabat. The Arabat Spit throughout the whole of this distance is low and sandy, varying from 300 yards to 300 feet in width. Down the centre of this southern basin, a maximum depth of about 4 ft. 6 in. was found to exist, the water shoaling steadily away to either shore, until in calm weather a hundred yards on each side was merely a quagmire, consisting of water, mud, and decomposed vegetable filth, and a foul unctuous bituminous deposit.

As we advanced from either shore towards the centre, this belt of filthy residuum, the exhalations from which give the name of Putrid to this sea, a bluish white soft clay was reached, much impregnated with salt, interspersed with belts of gravel, weed, and beds of fossil shell (small bivalves). It required some care in wading about here, even when holding on to the gunwale of a boat, for there were numerous holes into which the legs would otherwise have sunk deep enough, it was very evident, to have endangered a wader; possibly these spots were extinct mud volcanoes, for it was difficult to detect any difference of temperature between them and the Sivash generally, which throughout the summer felt like tepid water. As the drying up of the Crimean rivers took place, and rapid evaporation diminished the waters of the Sivash, large quantities of coarse crystals of salt were deposited all along the margin of the Sivash, and the intense salty bitterness of the waters of this extraordinary sea recalled vividly the descriptions we had read of that of the Dead Sea in Judea. The Sivash here, as in the clear portion to the northward, is far from unpleasing to the seaman's eye. Its waters are clear, blue, and sparkling, and form a pleasing contrast to the dingy yellow of the muddy Azov, bounded away to the far-west by the lofty ridges around the Chatir-Dagh, which about Kaffa and Kara-su Bazaar approach sufficiently close to relieve the eye of the traveller tired of the endless tiresome steppe, the horizon and framework to the scene, everywhere else when within the straits of Kertch.

It is possible that the amount of saltiness of the waters of the Sivash differs materially, and that it is purely dependent upon beds of salt in particular localities. We found it, however, bitterly salt wherever we went, the hands tingled as if placed in strong brine, and salt was freely deposited on the boat's sides and on the oars. None of the inhabitants of the Arabat Spit, and they were at one time numerous, drank of the waters of the Sivash, nor their flocks either. On that subject more information will be found under the head of Arabat Spit.

At the south extreme of the southern basin of the Sivash, the water again becomes excessively shoal, and on the Crimean shore reeds and weeds are generally more abundant than on the eastern side. The narrowest part of this basin is where the Salgir and Kara-su rivers discharge themselves by a common delta, though with two mouths, into the Sivash. This delta has evidently worn down the edge of the edge and deposited it in a long sloping inclination, but no channel could be found over the shallows which fringe these rivers' mouths. Within the entrance, Captain Commerell, who waded both of them, reported as much as 4 feet water in the Salgir, which had evidently been embanked, had a tract-path along its edge, and showed symptoms of being used as an artery

for supplying Simpheropol with produce brought from the eastward.

This narrow part of the Sivash and the river Salgir was the only water-communication within the borders of the Putrid Sea which we could learn was used as a means of supplying Simpheropol and Sebastopol by the Russians, and it ceased after Captain Rowley Lambert of H.M.S. 'Curlew' burnt the pontoons employed in it. Attention was first called to the subject by a letter in the 'Times,' signed by the 'Hertfordshire Incumbent,' subsequent to the forcing of the Straits of Kertch by the allied squadrons of Admiral (now Lord) Lyons and Admiral Bruat. The *modus operandi* was as follows: corn, rye, fish, and other products of the rich provinces watered by the Volga, Don, and the eastern rivers, were floated down to Taganrog, thence transhipped in Greek and Ragusan vessels, which, under Russian flag, traded in the Sea of Azov. They carried these stores to Arabat Bay, landed them at the fort, and, in a convenient spot, called by us Kiten Bay; thence the large number of draught animals and arabas at the command of the general commanding in Kertch Peninsula, enabled them to be forwarded up the spit, until at a convenient point opposite the Salgir; here they were embarked in broad flat pontoons, which, by the fluctuations of depth common to the Sivash, were able to slip into the Salgir over the shoals, and be thence tracked up as high as it was navigable, where the land-transport of the Crimea finally placed them at their destination—a pretty good proof of the energy and ability with which the Russians, when pressed, called into play all the resources of the country. Yet, on the other hand, it might be argued, that had they during peace taken more trouble to develop the facilities for intercommunication between one part of the empire and the other, instead of embarking all the national resources in the casting of cannon and building of forts, they would have been able to make a far more stubborn resistance, and not so entirely have broken down in the means of transport, after a trial extending over about 18 months.

A most remarkable and general feature of the Sivash is the fluctuation of its depth according to the direction of the wind. This is likewise a characteristic of the Sea of Azov, but the freshness of its waters, and their low density, explain the phenomenon far more easily than in the case of the Sivash, which must be far more salt and dense than any ocean. The shallowness of its depth is the only explanation that can be given for what we will now describe.

When the wind freshens from the eastward, the waters of the Sivash accumulate to leeward on the Crimean shore, and leave hundreds of yards of dry mud and marsh whence they have flowed.

The Tartars assert that 2 feet vertical is about the average height to which the water accumulates on the leeward side; and, although a formidable assertion, where the whole maximum depth is not 5 feet, still we saw no reason to disbelieve it, and it was not more extraordinary than the undoubted fact of spots of 6 feet of water being occasionally blown dry in the Gulf of Azov.

The Londoner may, I am told, witness the action of wind on water, on a small scale, by observing the Serpentine on a windy day, when it is blowing from one side of it to the other—results analogous to the subsiding of the water of the Sivash on one shore and its accumulation on the other then take place. The rapid current, which almost incessantly flows in or out of the Sivash, is fully accounted for by the changes of level within its great area, and the effort naturally made to fill the void; for instance, the very same wind which blows the waters of the Sivash towards the Crimean shore causes the Sea of Azov to be higher on its western than on its eastern border, creating of course a tendency to master the natural outflowing drainage of the Sivash.

Whether the direction of the current in Ghenitchi Strait is dependent upon the wind blowing at that outlet is very doubtful, for, between the three remote points of Arabat, Perekop and Ghenitchi (all situated on the shores of the Putrid Sea), there may possibly be at one time as many different winds blowing; the position of the culminating point of the waters of the Sivash, and the direction of effort of currents, whether in the strait or within the area of the Sivash, must of course depend upon which of those winds was the most powerful. For instance, a strong N.W. breeze in the Chongar river would cause the current in the strait to be flowing eastward against light airs in that direction, which might be felt at Ghenitchi.

And in a furious west wind, which in the summer sometimes sweeps the Tauridian steppe, we have seen the northern part of the Sivash almost blown dry in two hours time, and the bar across Ghenitchi Strait might have been easily waded by a man. Yet, at the same time, the southern basin of the Sivash would have shown a considerable increase of water, and a southerly current, in the teeth of a S.E. breeze blowing from the Black Sea over the Isthmus of Kaffa.

Next to these changes of level, and the rapid currents they occasion, the disagreeable exhalations from the shores of this sea have long been a subject of remark. The Russian authorities state it to be not only offensive, which it unquestionably is, but unhealthy likewise. On sanitary points, however, when the health of the Russian armies is the test by which salubrity is measured, it is as well to be incredulous; we saw men who had grown grey

on the Spit of Arabat, and who laughed at the question, replying to our queries, "Oh! the Russians say so because their soldiers die of putrid fevers. Where don't they die of putrid fevers? half-starved, ill-cared for, and over-worked, they die everywhere and abuse every place." We decidedly suffered from nothing but the offence to the sense of smell, and some of our vessels were months breathing the tainted air. After a hot calm day a sudden shift of wind off the Sivash brought the smell disagreeably strong; or a visit to its shores, and a walk in the mud, when the water had receded, was very trying to the olfactory nerves. The smell was like decayed vegetation, mixed with a peculiar smell not unlike gas-water, from which I infer that there are bituminous vents in the Sivash, similar to those existing in the Kertch Peninsula, and on Taman or Temriúk; indeed, mixed in the mud of this sea there was an oily tar-like substance, which I believe to be immediately connected with the putridity of the Sivash, and to ferment with the action of the sun and salt, throwing off a foul scum which one approached very unwillingly. That birds should breed in such a salt marsh is very remarkable, as showing that their food is there to be found. The Muscovy duck and the common diver, or shag, fed and bred in the Sivash in vast numbers: and in the shoal water and marshes, abreast of Chongar Strait, in which we spent a broiling day, we could see abundance of weed, as well as shoals of young fish, though the water was so salt that our skins, where it touched, became as red as if placed in exceedingly hot water.

Winds.—We were led to expect that constant westerly or s.w. winds would prevail during the early part of the navigable season in the Sea of Azov, but did not experience any such winds, though there can be no doubt that there, as elsewhere throughout Europe, the winds, after the vernal equinox, have a general southerly or westerly tendency, bringing warmer weather, and ushering in the summer. Towards July hot easterly winds set in, and, after the middle of the month, blow with considerable violence; they seldom lasted through the night, especially in with the land. This mistral generally commenced and subsided with the rising and setting of the sun. A strong glare and haze to the eastward at day-break was an invariable forerunner of this wind, and if upon the western coast of the Sea of Azov, a heavy swell always preceded the wind.

It is this easterly wind which has been known to diminish the water in the Gulf of Azov to the extent of 4 or 5 feet. Dr. Clarke, the traveller, asserts that the inhabitants of Taganrog have crossed to the opposite shore dry-footed, but that I believe questionable, as it would involve a channel 11 feet deep being blown dry!

Vessels in shallow water, on the east side of the Sea of Azov, as well as in the gulf, run a risk of being left aground during these strong breezes, but if care has been taken to anchor where the bottom is not hard sand, there is no danger in letting a vessel lie upon the ground—there being no rocks throughout the whole length and breadth of the Sea of Azov, except the “Vesuvius Rocks” off the town of Zelenia, a spot little likely to be visited by merchantmen.

Arabat Bay, and the whole extent of the “Touka,” or Arabat Spit, are much exposed to these easterly winds, and there the short breaking sea, and dangerous surf and undertow, render boat’s work, whether for military or commercial operations, extremely hazardous.

After the end of August, these easterly winds, which have blown without intermission for a fortnight at a time, commence to abate, and are succeeded by short fierce squalls from the northward, varied with s.e. winds, which are preceded by dense fogs.

In the Gulf of Azov these true s.e. winds are, from the direction of the land, turned into easterly winds; but their character, and the fogs which accompany them, distinguish them clearly from the hot summer winds which blow from the vast sun-scorched steppes of Russia. Great and sudden variations of temperature are now experienced; 16° or 20° was not an unusual occurrence, and within twenty-four hours the temperature has fluctuated twice from 65° to 45° of Fahr., accounting fully for the squalls from the northward, and dense and sudden fogs from the s. These squalls give plenty of indication by a dense body of black clouds in the quarter from whence they may be expected.

In the neighbourhood of the “Sivash,” that is, from the head of “Oukliouk Liman” to Arabat Fort, these tornadoes blow with great violence, and generally from the n.; sometimes they are attended with much heavy thunder and lightning and hail of a formidable character.

Along the northern coast of the Sea of Azov, from Ghenitchi to Berdiansk, these squalls are usually from the n.w. or w.n.w., and from Berdiansk to Taganrog from n.e. to e.n.e. From the early part of October to the close of the navigable season heavy gales from the s.w. are frequent, varied with a blow from the eastward.

Completely landlocked as this sea is, and having no high lands bordering its shores, the seaman would naturally suppose that it could not be a very windy one; we, however, found it far otherwise; and the sudden manner in which the short and breaking sea got up called for good anchoring-tackle, especially if caught in an autumnal gale to leeward of all shelter, and obliged to anchor in the open sea. The Vesuvius and Grinder gun-boat were so

situated in a heavy easterly gale in November, 1855, and, although anchored in 40 feet water, and riding with 100 fathoms of chain a-head, they drove some distance, and the sea broke so much as to endanger the gun-boat considerably.

With westerly winds there is a total want of harbours in the Sea of Azov, especially at the trading ports of Berdiansk and Mariupol, and even off Taganrog, in what is called the "18-foot hole," a heavy sea rolls in. The holding ground is, however, good.

With easterly winds a seaman will generally find shelter by running under the lee of the various spits which project from the northern coast, avoiding, if possible, the Obitotchna, both on account of the shoal ground about it, as well as the difficulty of sighting a sand-bank, on which there is neither beacon nor light-house. Vessels caught in an easterly gale when near to the Strait of Yenikale, but unwilling to proceed to Kertch for shelter, will find safe anchorages at the following places:—

(1.) Under the lee of Ziúk Point and shoal.

(2.) In Kazantip Bay, off the village of Chagani, taking care not to anchor in less than 20 feet water, as it shoals abruptly from that.

(3.) In Arabat Bay, either under Cape Kiten or abreast the sandy isthmus connecting Cape Kazantip with the main.

No. (1.) is however the best; for should the wind back to the n.e., and blow, as it sometimes does, with much violence, vessels at anchor in any of these places must weigh and either bear up again for Kertch or stand on the starboard tack for Ghenitchi, where an admirable and safe anchorage may always be found in 18 to 19 feet water.

The East extreme of the Town of Ghenitchi	N. ^{True} 22° W.
South extreme of Beriutch Spit	S. 45° E.

In n.w. gales, which are not unusual in the autumn, especially upon the coast of the peninsula of Kertch, there is only one good anchorage, except in the Strait of Yenikale, throughout the southern part of the Azov, and that is under Cape Kazantip, in Kazantip Bay; but care should be taken to give a berth to the Wrangler patch. That patch is a cone of hard sand, which has formed round a sunken rock; it is steep to, shoaling suddenly from 5 fathoms to 11 feet, with only 8 feet water on the apex.

A vessel caught in a n.w. gale, 40 or 50 miles n.n.e. of Fanar Light, and the weather, as it often is, thick about the entrance of the Strait, must be careful not to get to leeward and run into Temriúk Bay; she should either anchor and ride it out where she is, or go into Kazantip Bay. Many Greek vessels are, I was told, annually lost in Temriúk Bay, and there were no less than six wrecks seen there in 1855.

Currents.—The currents at the northern entrance of the Straits of Yenikale are occasionally strong and very uncertain in their direction during the early spring and late in the autumn; this is occasioned, no doubt, by the strong local breezes in the sea of Azov on the one side, and those of the Black Sea on the other, as well as by the variations in the volume of water discharged at those seasons by the rivers of the Caucasus, the Don, and other streams, into the basin of the Azov.

The Sea of Azov, apart from being shallow, is less salt, and consequently of less density, than seas usually are; the action therefore of the wind, in increasing its depth in one part or diminishing it in another, is as natural as it is undoubted. Currents are, therefore, common, and I may almost say constant, throughout its whole area, and the assertion by M. Taitbout de Marigny in his generally correct and valuable 'Black Sea Pilot,' that there is little current in the Sea of Azov, is a palpable error. For instance, all the Russians agree in stating that the fluctuations in the volume of water in the Gulf of Azov were very great, and entirely depended upon the direction and force of wind. These fluctuations, it need hardly be said, could not take place without proportionately strong currents.

With easterly breezes of a force of 4 or 5 (a double-reefed breeze) we found the water in the basin of the Sea of Azov diminish about 2 feet on the weather side, and rise as much upon the leeward or western coast, and *vice versâ* with westerly gales.

Captain Lambert, in the Curlew, experienced off Mariúpol in a N.E. gale a fall of 5 feet of water, whilst we at the same time off Temriúk had (as far as could be observed in a cross-sea) an increased depth.

Such a banking up of the water appears nothing but natural in a wide-spread shallow basin, having but a narrow outlet at Yenikale, with another sea on the opposite side, in which strong gales from a contrary direction are often at the same moment blowing. Apart from these irregular currents, the rates of which are dependent upon the force of the wind, and which require the navigator to allow for their drift in shaping his course, there is a constant flow of water from the Sea of Azov into the Straits of Kertch, and thence into the Black Sea.

This discharge of the superabundant water of the Sea of Azov is sometimes checked by the action of a strong southerly gale in the Black Sea; but it never is for long; and occasionally, after the water being so pent-up, the current will run out of the Strait of Yenikale at the rate of 3 knots per hour. This natural current of the Sea of Azov is fed from three quarters:—

1st. From the Don, Donetsk, and other streams, which discharge

themselves by a delta 15 miles in width, containing 14 or 15 mouths.

2nd. From the Sivash, or Putrid Sea, which drains all the eastern and northern shores of the Crimea, and receives the flow of the Salgir and Kara-su.

3rd. From the drainings of that extensive series of Limans comprised between Taman and Kamisheva on the east.

The current from the Don, first mentioned, may be said to be the main one flowing down the gulf. We see its action and direction in strong and unmistakable characters in the remarkable spits which extend from either shore. At the entrance of the Gulf of Azov, or, as the French have better named it, "Gulf of the Don," this current forks in three directions: the centre flows on in a s.s.w. course about 1 knot per hour, and impinges with considerable strength upon the coast of the Kertch peninsula from Cape Kazantip to Cape Kamenoi.

The northern branch of the Don current flows from Bielosarai spit in a w. by s. direction; we have found it varying from 1 knot to a knot and a half per hour. This current it is that has, in the lapse of ages, formed the extensive spits of Berdiansk and Obitotchna, and, met by the counter currents of the Sivash and westerly winds, created the broad extent of alluvial deposit known as the Beriutch spit.

The strength of this current is very perceptible to an observer standing on the south extreme of Beriutch spit, which is almost steep, with 18 feet water 100 yards off it. The stream flows direct towards Arabat Spit, inclining southward, although at times in the autumn, when the Sivash is low and an easterly wind causes the water to flow into it by the Strait of Ghenitchi, the current I have alluded to evidently curves up Oukliouk Liman, and supplies the drain caused upon it.

However the main tendency of the current before alluded to is southward, pressing strongly the while upon the beaches of the "Touka," or Arabat Spit, and depositing upon it all wreck, drift-wood, and other foreign substances brought out of the Gulf of Azov. Curving round Arabat Bay, and no doubt occasioning the very disagreeable sea peculiar to that locality with the least easterly wind, this northern branch of the Don current re-unites itself to the main stream about Cape Kazantip, and flows thence for the Straits of Yenikale. One of the strongest proofs that can be adduced of the existence of this northern branch of the Don current, apart from the information of the Greek pilots and our own observation, was the fact that within six weeks of the destruction of the Russian mercantile marine in the Sea of Azov by our squadron, the whole extent of Arabat Spit was strewed with wreck, although they had been mostly set on fire at distances varying

from 60 to 90 miles to the E., or on the track between Berdiansk and Kertch.

The southern branch of the Don current is, perhaps, the most questionable, though my authority for it was a very intelligent Ragusan seaman who had sailed in the Sea of Azov for many years. He asserted that this branch flowed nearly due s. as far as Kamisheva Point, and had formed the shoals and spit of the same name—an opinion which I fully agree in, and am of opinion that curving thence towards the Zelczin bank, in consequence of the outflow from the great water-intersected deltas of the Kuban, Protok, Beysough, and Chelbassy, it becomes identified with them, and may no longer be called the current of the Don.

The second important feeder of the Sea of Azov is from the Sivash or Putrid Sea; that current is occasionally interrupted, but yet that interruption is always followed by an accelerated discharge of water. The direction of this current is E. and W. in Ghenitchi Strait, but from the Oukliouk Liman it joins the northern branch of Gulf of Azov current, and sweeps southward with it along the Spit of Arabat. For further information as to the current of the Sivash, see the article under the head Sivash.

With respect to the third and last of the currents which keep up the healthful activity (if the term may be applied) of the basin of the Sea of Azov, it is simply derived from that series of deltas of rivers which lie E. of the peninsula of Taman, and, with the Kuban, drain the Ciscaucasian territory. These deltas comprise about 95 miles of low marshy country, and during the thaws of early spring and rains of the autumn a vast body of water is discharged by innumerable channels into extensive lagoons or "limans," as they are called, and thence into the Sea of Azov. This body of water naturally seeks an outlet by the Strait of Yenikale, and, owing to its freshness, the surface of the sea at Yenikale and Kertch are often fresh and potable when that of Arabat or Berdiansk is undrinkable; but the source of this current is liable to sudden changes, and, discharging over extensive and shallow "limans," an adverse wind easily checks the flow of water, apart from the droughts and other causes common to streams flowing from a steppe country.

VI.—*Notes taken on a Journey eastwards from Shiráz to Fessá and Darab, thence westwards by Jehrúm to Kazerún, in 1850.*
By Consul KEITH E. ABBOTT.

[For Map, see p. 108.]

Communicated by the EARL of CLARENDON.

Read, February 23, 1857.

I HAVE already, in a previous paper, described the tour which I performed from the town of Kermán to Khubbes, and thence through some of the southern districts of Kermán to Shiráz, the capital of Fars. Wishing to see more of the latter province, I determined on returning eastwards, and accordingly, on the 18th of March, 1850, I quitted the country quarters I had occupied at Ferhadabad, and presently leaving Shiráz behind, proceeded along the plain in the direction indicated in the margin.* Before leaving Ferhadabad, I took various bearings of objects in the vicinity of Shiráz, which it may be useful to detail, premising that my position was at about 1 mile from the town, on a bearing of 25° E.

Dome of Shah Cheragh in the town	210°	
Village, Kaleh Mahomed Sherif Khan	175	3½ miles distant.
„ Mevizabad	185	3½ „
„ Kaleh Aly Abad	175	4½ „
„ Kaleh Newab Alieh	200	3½ „

* *Distances and bearings.*

$\frac{3}{4}$ mile	155°	1 mile, 150° to 140°, skirting hills on our right.
$\frac{2}{3}$ „	165	$\frac{1}{2}$ mile 120°
$\frac{1}{2}$ „	135	$1\frac{1}{3}$ „ 115
$\frac{1}{3}$ „	160	$1\frac{1}{2}$ „ 110
$\frac{1}{6}$ „	155	$\frac{2}{3}$ „ E. through hills.
1 „	160	$\frac{1}{2}$ „ 115 and 110°, descend to margin of lake.
Village of U'júwar $\frac{1}{4}$ mile to left, and Mevurzabad $1\frac{1}{2}$ do. to right.		
$\frac{2}{3}$ mile, 160°, Kaleh Mahomed Sherif about $\frac{3}{4}$ of a mile to left, and Jasperabad close by.		1 mile 115°
Narrow tract of Salt Kevvir.		
$1\frac{1}{6}$ mile. Village of Aly Akber Khann $\frac{3}{4}$ mile to right, and Kúshkh-e-Maydan 1 mile to left; here the Kevvir terminates.		$1\frac{1}{2}$ „ 110 105° and 80°
1 mile, 145°. Village of Alliabad 1 mile to right.		$\frac{1}{3}$ „ 105
$\frac{1}{3}$ mile 175°		$\frac{1}{2}$ „ 165
$\frac{1}{3}$ „ 130		$\frac{5}{6}$ „ 135
$\frac{1}{3}$ „ 125	Village	$\frac{1}{2}$ „ 120 and 115°
Kechi 2 miles to right; Deh Nú bore 165° 2 miles off.		$\frac{1}{3}$ „ 145 general bearing.
$\frac{1}{2}$ mile, 125°. Reach Púl-e-Fessá, a bridge.		$\frac{1}{3}$ „ 140
		$\frac{2}{3}$ „ 145 and 150°
		$\frac{2}{3}$ „ 170
		$\frac{2}{3}$ „ 160
		$1\frac{1}{3}$ „ 155 to Mohullá.
		—
		22 miles.

Village, Adilabad	220	3 miles distant.
„ Ahmedabad	225	3 „
„ Ahmedabad Bozourk	245	3 „
„ Kúshan	260	4½ „
„ Deh Kúrréh	270	3½ „
„ Kúshkh Abbass Aly	230	2 „
Palace, Takht-e-Kujjerieh	295	3½ „
Garden, Bagh Nari	220	1½ „
„ Bagh Eham	280	2 „
„ Jehan Nemah and Bagh Nú, both adjoining Ferhadabad.		
Haft Tenn	115	¼ „

The productions of the plain of Shiráz consist of grain—wheat, barley, millet, Indian corn and rice—and cotton, besides a variety of fruits. The villages appear to be almost invariably walled in; some possess gardens, but many of them are almost without a tree.

From Janferabad, at the 4th mile from Shiráz, the road crossed a narrow tract of salt kevvir; and at the 9th mile we passed over the Púl-e-Fessá, a bridge of nine small arches over a trifling stream, which flows from the district of Karabagh, and falls into the neighbouring lake. From thence, in a direction of 150° , we skirted hills, which here commenced on our right; whilst to our left, at about 3-4ths of a mile, rose another parallel range, the intermediate space being a salt kevvir and marsh. At the 12th mile we passed close to Bermashúr, a hamlet, where the land is cultivated, and is perfectly studded with wells, from which water is drawn by bullocks for the irrigation of melon-grounds. As we proceeded, we observed the surface of the country to be swarming with young locusts about 1-5th of an inch in length, and not yet provided with wings. At $13\frac{1}{2}$ miles we entered a passage through low hills, a shoot from the main range on our right, extending northwards about a mile into the plain, and this led us presently to the border of the salt lake, known as the Deriah-e-Nemek. We proceeded along its margin on a bearing of 115° to a turn in it, which occurred at the $15\frac{1}{2}$ mile. Looking back, the shore of the lake ran in a direction of 305° —a distance, it was stated, of 2 fursacks, or 7 miles. Its north-western extremity is studded with villages, of which I counted in the distance about 20. I heard the cuckoo's note this day, and observed pewits, starlings, storks, the thrush, called in French “merle à plastron,” hooded and common crows, and waterfowl. Clumps of wild myrtle are observed in approaching Mahullú, a village which we reached at the 23rd mile. We find some of my people, who had gone in advance, engaged in an alarming contest of words, and symptoms of a more violent kind, with old women and young, men, children, and dogs,

all of whom appeared to be exerting their lungs in an extraordinary degree; while some were struggling with my servants to prevent their appropriating to my use one of their miserable hovels. The Eel Khani's people, who accompanied me, were dealing gratuitous blows with marvellous little regard for the feelings of the recipients; but this I would not permit any longer, and my arrival seemed at once to pacify the hags of the village. I spoke kindly to them, and assured them I would reward any one who would give me quarters, and an immediate armistice was brought about. The poor people set to work sweeping out several of their hovels for my party; but on learning that their habitations were the abode of legions of vermin, I took up my quarters in the open air.

Mahallú is a poor village, situated at about 3-4ths of a mile from the lake, and, by my reckoning, 22 miles from Shiráz; it possesses some garden-land, a few cypress trees, and some 60 or 70 families.

The villagers stated the length of the lake on this side to be about 5 fursacks; on the opposite side, 6 or 7 fursacks; and its breadth 1 fursack, or $3\frac{1}{2}$ miles. It is very shallow, and appears to be mainly supplied from only two streams—that which we passed this day, and a smaller one on the south-eastern extremity. As, however, these must be insufficient to supply so large a surface as that of the lake, there must be some other source; and the villagers say, that the drainings from the surrounding mountains after rain make up the account. In summer the southern end of the lake, for about 2 fursacks northwards, becomes dry, and covered with a deep deposit of salt, varying from $1\frac{1}{2}$ to $3\frac{1}{2}$ feet in thickness, so that it may then be crossed on foot. The salt is carried for sale to Shiráz and the villages of the plain.

The lake may be said to extend in a general direction N.W. and S.E. It appears from Mahallú (though it is not really so) to be shut in by mountains in all but its northern extremity, where it is bounded by the plain of Shiráz.

We entered the district of Servistan in descending to the lake.

19th March.—From Mahallú we proceeded on a bearing of 120° , 155° , and 165° ; but my watch having got out of order, I was unable to estimate distances exactly on this march. The south-eastern extremity of the lake runs in a direction of 120° , therefore rendering the north-eastern longer than the south-western side. We crossed one small stream and then left the lake behind us. Our path led us between E. and S.E., through a smooth uncultivated plain, extending in a direction E.S.E. and W.N.W. At the 12th mile we reached a ruinous village called Kheirabad, from whence I took the following bearings:—

Village, Kúyounjoun	235°	3 miles distant.
„ Púlekelunter (ruined) ..	240	3 „
„ Beit-úl-Allahí	255	5 „
„ Khosrúabad	145	1½ „

This appears to be a very thinly-inhabited plain, and very little cultivated, but the district contains 23 villages. Flocks of sheep and goats, almost all black and brown, as most of the flocks of this province would appear to be, were almost the only noticeable objects.

From the above-named village we proceeded in a direction generally a little s. of E., immediately passing Kennú, a village to our right, thence to Ketta Gúmbez, another village; and by a course a little N. of E., passing Rebat a mile to our left, we reached Búrzú, called also Servistan, the chief village of the district, situated at 7 fursacks, or $24\frac{1}{2}$ miles from Mahullú, and containing, it was said, 800 families. The heat had been very oppressive during this march, and we were evidently approaching a warmer region than that of Shiráz. Búrzú is embosomed in gardens and orchards, producing a variety of fruits: many of the trees were in blossom, others covered with the brightest green.

Immediately south of this village is another large one, called Tezing, said to contain 600 families, likewise embosomed in orchards; but only two or three other villages of this plain seem to possess gardens and groves.

The inhabitants stated that their fields having last year been ravaged by the locusts, they had laid very little land under cultivation this season. They endeavour to destroy the insects by digging trenches, driving them in, and throwing earth on them—a remedy which can, of course, be carried only to a limited extent.

Salt and sulphur, both stated to be the deposits from springs of water, are found in this district.

20th March.—Our direction from Búrzú was s.e., and presently 115° over a fine carpet of grass mixed with tufts of the green tragacanth plant, which covers this end of the plain. At about the 4th mile we reached a country of low hills and ravines, clothed with tufts and bushes, and a sprinkling of trees chiefly of the benneh. The wild-almond bush grows also abundantly, and was in full bloom: it bears a white, scented blossom. The stem and principal branches are of a very dark colour, and from them spring innumerable small twigs—straight, and of a pale green at all seasons.

At the 6th mile we passed two unoccupied watch-towers, and from thence our direction varied between 80° and 125° by rises and falls; after which we commenced an easy, but long descent over stony ground, generally in a direction s.e., the country and moun-

tains on both sides lightly clothed as before. At about the 12th mile we alighted near the ruins of a caravansary, at a stream of water, and here I shot a hare of a small species found in these parts; it did not exceed in length two short spans, from nose to tail. After breakfasting we continued the descent, on a bearing of 115° and 110° , and, at the 14th mile, 105° . We passed many flocks of mixed sheep and goats, belonging chiefly to the Baharlú tribe, of which we observed small encampments scattered over the country. One of my attendants stated that this tribe numbers 2000 families. We passed two other ruined caravansaries, proceeding, first, by a gradual ascent in a direction S.E. for a few miles, and then, by an easy descent by a rough road, still on the same general bearing, and, as we neared the plain of Fessá, meeting more flocks, followed by divisions of the Baharlú tribe, migrating to higher ground. Their beasts of burthen consisted almost entirely of asses. On getting fairly into the plain of Fessá, we proceeded on a bearing of 110° , and were presently met by a party of horsemen, headed by a relation of the governor, sent out to welcome me. Some of them were excellent riders, and exhibited their skill by turning in their saddles whilst at full speed, and firing at objects on the opposite flanks of their horses—a feat which I fancy it would be impossible to accomplish on a European saddle. We reached Fessá, after performing what is called 11 fursacks, or $38\frac{1}{2}$ miles, but which, I think, does not exceed 9 fursacks, or $31\frac{1}{2}$ miles. The plain extends in length E. and W., and may be about 7 miles in breadth. Fessá itself, which is merely a large village of some 900 families, with a detached mud fort and some pleasant gardens, stands in the midst of it towards its western extremity. The land belongs chiefly to the Governor Mirza Mahomed and his relations, by whose family the government of the district has been held for ages past. On alighting, I was most courteously and kindly received by Mirza Mahomed, who proved to be an old acquaintance of many of my countrymen who have resided in Persia. He spoke particularly of Sir John McNeil, Sir Henry Bethune, Colonel Shee, Mr. Bruce and his suite; and he mentioned Lieut. Wyburd, as having resided at Fessá with him for more than a year, and of his being accompanied by a doctor, who died there.

I inquired in vain for any building near Fessá which might answer to the description of the tomb of Cyrus, this district being supposed by some antiquarians to represent the ancient Passagarda. A tomb exists near the village Meymúni, but the description given of it by a native of the place convinced me it could not be what I sought for.

The period of my visit was the second year in which the locusts had ravaged this district; we saw swarms of them, and people were daily employed in destroying them in the manner I have

already described. I had difficulty in procuring grain for my horses; and in some parts of the country, such was the distress, that the people were obliged to resort to the miserable alternative of feeding on the insect. The locust is described as being of two kinds; the Deriai or sea, and the Missri or Egyptian locust. The former are least destructive to the fields, but do great damage to the trees. I collected many particulars regarding these insects, but as they frequently appeared to me fanciful, and not really the result of observation or investigation, I omit them here. Laristan is the country from which it is supposed they generally proceed.

The district of Fessá extends E. and W. about 45 miles, and varies in breadth from 9 to 15 miles. Its villages and hamlets amount in number to 33; and its productions are chiefly barley and wheat (the former in ear on the 21st March); 5 to 12-fold is the ordinary yield. Indian corn, millet, sessamè-seed; and tobacco, cotton, and rice, are produced in small quantities. The country is, generally speaking, Ghermsir, or warm region, but cooler than Darab. The plain has a dreary deserted appearance, and the mountains around arid, and with few traces of vegetation.

Near the fort a mound is shown, which is said to mark the spot where Felamerz, the son of Rústum, was defeated by Behram. The latter caused him to be hanged, and his tomb formerly existed in the village, until, it is said, a European traveller carried off the slab as a relic.

On the 22nd March I quitted Fessá, after a friendly greeting from the Governor, whose kindness and courtesy I shall long remember. We proceeded at once towards the Kaleh Zohauk, situated at 2 miles south of Fessá: the site is a high, artificial mound of soft earth, surrounded at some distance by the remains of a broad ditch. The area within is strewn with stones and fragments of brick and pottery, and is now partly under cultivation. To the S.E. and S. low mounds of earth, stones, and bricks, show that the town extended beyond the ditch in that direction. The place is reputed to have been the residence of Zohauk, a prince in whose history much Persian fable has been introduced; but I could learn no further particulars of its previous annals. From the mound I obtained the following bearings:—

Fort of Fessá	.. ..	330°	1½ miles distant.
Village of Fessá	.. ..	335	2 "
" Benian	.. ..	345	2½ "
" Kelnakú	.. ..	5	2 "
" Desht Ahmed	.. ..	15	¾ "
" Kheirabad	.. ..	45	¼ "
" Kúshkh-e-Kazin	.. ..	30	1½ "
" Deh Desteh	.. ..	170	1 "
" Harúm	.. ..	95	2 "

Village of Sehrarúd	135°	3 miles distant.
„ Mahomedabad	125	3½ „
„ Chuggat	270	2 „

Mountain of Sallú, at the foot of which rises a spring depositing salt, 305°, 4 miles distant.

From the mound our path led, for about 1 mile, in a direction S.E., when it altered to 125° for ½ a mile, and we then passed Deh Desteh, situated close by to our right. This village possesses a few date trees in common with others of the plain: thence the bearings were as follows:—

1½ mile S.E.
½ „ 125°
1½ „ 105° and 115°

to Súdabad, and ½ a mile beyond to Mahomedabad, two villages, the latter of which, situated on the southern side of the plain, and possessing a large detached garden and vineyard; a pleasant spot, planted with cypress and forest trees, rose-bushes, &c., where we alighted to breakfast, putting to flight a crowd of women who had congregated there. Between the two villages is the bed of a stream, then dry, the direction of which is from N.W. to S.E.

From thence we rode ¼ a mile, on a bearing of 65°, and presently perceived the surface of the ground quite darkened with young locusts about ½ an inch in length, but still without wings.

Thence our bearings were—

E. .. ¼ mile.	
100° .. ½ „	to Gheasabad.
85 .. ¾ „	
105 .. ½ „	
95 .. 1 „	to the large village fort of Núbundegran, passing through which we proceeded ½ a mile on a bearing of 75°.
55 .. ⅓ „	
65 .. ⅓ „	
80 .. ⅓ „	
65 .. ¼ „	
75 .. 2 „	to village of Ghillian.
55 .. 1 „	to foot of hills through which we passed on a bearing of 50°, ½ mile.
	„ 30°, ½ „

Rain, which was greatly needed in those parts, here commenced falling, and lasted during the remainder of the day. Thence ½ a mile on a bearing of 45° amongst hills; crossed little stream flowing s.w.; then 1 mile 60° and 50° to small village fort of Múrdi; after which, by gentle descent, 35° ½ a mile, 50° ½ a mile, and 60° ½ a mile, into a valley; 1½ mile 90° and 80°;

1 mile 65° and 70° , the valley expanding into a plain; then 2 miles in general direction, 60° to the village Shish Deh, where nearly all the male inhabitants turned out to meet me. The distance by the direct road from Fessá is reckoned at 6 fursacks, or 21 miles; by visiting the Kaleh Zohauk we added something to it, as by my estimate we travelled 23 miles.

The plain of Shish Deh is shut in by high hills and mountains, and is well cultivated in parts. It extends from w. to e. and s.e., and is of inconsiderable breadth. The village Hussimabad is at $1\frac{1}{2}$ mile distant to the s.e. My kind friend of Fessá had determined his attentions should not cease on my quitting his village, and I found at Shish Deh everything prepared for me by his directions.

23rd March.—Our march this day commenced on the following bearings:—

$1\frac{1}{4}$ mile, 110° and 120°
 $\frac{3}{4}$ „ 75° ,

to an encampment of 35 tents of the Karúni, a division of the Aynarlú, a tribe said to number 2000 families in some 30 divisions.

$\frac{1}{4}$ mile E.
 $\frac{1}{2}$ „ 70°

to a ruined village; here discovering that we were on the wrong road, we proceeded—

$\frac{1}{4}$ mile, 150°
 $\frac{1}{8}$ „ 45°
 2 „ 140°

when, having regained the proper route, we proceeded—

$\frac{1}{2}$ mile, 135°
 $1\frac{1}{4}$ „ 125°
 1 „ 100° and 90°
 $\frac{1}{4}$ „ 115°
 $\frac{3}{4}$ „ between 115° and 130°
 1 „ 135° , 120° , and 125°
 $\frac{1}{2}$ „ 130°
 $\frac{1}{2}$ „ 140°

to another encampment of the Karúnis. The tents of Eeliats in Persia are generally of one description, made from black goat's-hair sacking, supported on poles. I alighted at this encampment to allow of my baggage joining from the rear, lest the inhabitants of the tents should take a fancy to it. The people were civil enough, but many of them had collected with clubs armed with heavy knobs, usually carried by the men of the tribes.

We proceeded on a bearing of 145° for $1\frac{7}{8}$ mile, passing the

site of a town, the only remains of which consisted of the foundations of walls, and stones strewn plentifully over it. It is known as Karabúlak; and at $1\frac{1}{2}$ mile north-west of it, the highest part of a range of mountains is said to possess the remains of a castle known as the Kaleh Mallek-e-Shebriar. We then made $\frac{1}{4}$ ths of a mile in a direction 140° to the small village fort of Darakú, surrounded by a ditch of water, where I again found myself indebted for a breakfast to my kind friend at Fessá. Leaving Darakú, we proceeded $\frac{1}{4}$ ths of a mile on a bearing of 130° , when the plain terminated in an uneven valley, in which the benneh-tree, then in leaf, abounds. The young leaf has a resinous, aromatic odour. We made $\frac{1}{4}$ ths of a mile in a direction of 100° , then $\frac{1}{2}$ a mile by a very difficult road, and through a narrow defile, in a direction between E. and N.E., occasionally by short abrupt turns, after which we ascended the hill side on to a better road leading $\frac{1}{2}$ a mile between E. and S.E., which brought us in sight of the plain of Darab. Thence occurred a short, but difficult and dangerous, descent; then $\frac{1}{8}$ th mile 260° , and varying from 160° to 90° , $\frac{1}{2}$ a mile, by an infamous road, where fossil shells and impressions of the same are found. There is a belief that this part of the country was once covered by the sea. Then $\frac{1}{2}$ a mile, from 120° to 110° , which brought us fairly into the plain; $1\frac{1}{2}$ mile, 110° , near high and bold mountains to our left. The plain extends nearly E. and W., and on its northern side is extremely stony, and abounds with the kúnar-tree and gum-tragacanth plant. The southern side appears to be destitute of trees. Proceeding 1 mile on a bearing of 85° , $\frac{1}{2}$ a mile 105° , and $\frac{1}{2}$ a mile 90° , we came to more remains of stone buildings covering a considerable space, but only the foundations remain. A good deal of fine turf grows in this part, and a bush with an aromatic leaf, and resembling that of the pepper-tree. Two miles further were made in a direction of 105° , and 2 miles E. We crossed four small streams flowing into the plain from the N.E.; and, quitting for a time the wooded part, proceeded for $\frac{1}{4}$ ths of a mile S.E., passing more and extensive traces of stone habitations, evidently like those already noticed marking the sites of former towns. Here mountains project into the plain from the N., and one of rock-salt is conspicuous from its variety of colouring. At the foot of this mountain issues a diminutive spring of water, which leaves along its course a beautiful incrustation of salt.

Three-fourths of a mile further, on a bearing of 110° , brought us to a small stream, 20 paces wide, flowing S., and immediately afterwards to a second. One or two villages, with tall palm-trees, were observed, after which our course led through low jungle of prickly bushes which shelter the Francolin. We made 3 miles further on the above bearing, then E. for 4 or 5 miles, passing in

this space low hills projecting into the plain, when, long after nightfall, we reached some hovels. Again we proceeded for about a mile, and reached the outskirts of Darab, that is, its palm-groves, through which we passed for another mile or more, much wearied with the length of the journey and heat of the weather. The distance from Shish Deh is nominally 10 fursacks, or 35 miles, which is probably correct.

As we approached Darab the air was fragrant with the delicious odour of orange and lemon blossoms from its many groves and gardens. In the absence of the governor Jehanghir Khan, a son of my friend the Eel Khani of Fars, I was most courteously and handsomely entertained by direction of the princess his wife, a sister of the late Mahomed Shah.

Darab, or Darabjerd, an ancient site, is fallen from its former consequence, and is now a mere cassabeh or large village, occupying, with its gardens and groves of orange, lemon, and palm-trees, a very considerable space. The mountains on the north of it form an amphitheatre, the deepest part of which is about a mile from the town, which extends towards the two horns of the crescent. To the south rises at a short distance a long line of rocks which at one part are sculptured on their southern face, and between them and the houses of the place is situated a small mud fort of no pretensions. The place possesses no elevated ground, and is in this respect wanting in the picturesque; but viewed from a house-top the scene is very pleasing, so great is the extent of the foliage, which, at the time of my visit, was of the most beautiful green. The palm or date-trees scattered over so wide a space are numerous, but generally planted wide apart. The people appear to have neglected the cultivation of this valuable tree for some time past at Darab. It is affirmed that 50 years since the number of date-trees was 100,000, of which only 30,000 remain. They are taxed according to their bearing. Offsets from them, when transplanted, become, in the course of some years, a source of wealth to their owners.

Darab possesses no bazaars, but only a few shops, of which six are of linen-drappers, dealing in English manufactures.

The climate of the district is oppressively warm in the plain during the summer months. In winter snow is rarely seen there. The climate of the hills, of course, varies with the elevations. We found the flies most troublesome, but they are said to diminish in numbers with the approach of great heat.

The productions of the district are wheat and barley, zobret seffid (a species of millet), rice, tobacco, sesamè-seed, and cotton: but every where there was scarcity, this being the seventh year of the visitation of the locusts, each year proving more disastrous than the preceding. The peasantry were reduced to the utmost

distress—to devouring the locusts, and to the use of wild herbs. The revenue raised is 14,000 tomans (6300*l.*), amongst a fixed population of 2300 families belonging to this district. The soil is reputed of great fertility in many parts when rain falls in sufficient quantity; grain yields from ten to fifty fold. The hills on the southern side of the plain having no water are, I believe, uninhabited. I heard of no mines at present worked in this part of the country, but old iron mines are said to exist at Shekkarú. The district possesses plenty of flocks and herds. Of the former, which are usually black and brown, or reddish, as in other parts of Fars, goats are more numerous than sheep. The extent of the district is 14 fursacks, w. to E., and 6 from N. to S.

In the neighbourhood of Darab the objects pointed out as worthy of attention are the following:—

The Kalah Darab, consisting of a mud rampart 35 or 40 feet in height, encircling an isolated rock, from which it is distant some 800 paces. The rock itself is situated in the plain, at about 4 miles from Darab, on a bearing of S.W. The ramparts appear to have been flanked at short intervals by earthen towers, and a broad ditch, at present partly filled with water and reeds, in which wild-fowl lodge, encircles them. On the N.E. an aqueduct has been carried across the ditch, and has consisted of substantially arched masonry, of which only some remains are now seen. This extended some way into the plain, and a watercourse of masonry is continued from it within the rampart towards the rock. There is no sculpture found here. The area within the ramparts is strewn with remnants of large bricks, pottery, and stone. The rock itself has been crowned with buildings, and a well has been sunk from its summit. It is said this place was destroyed by the troops of Omer.

From the rock I took the following bearings:—

Village Janisi, adjoining the Kalah Darab, 340°

Town of Darab. 40°

Hills south of Darab, stretching from 25° to 35° } These two ranges lie in a
40° „ 90° } line from W.N.W. to E.S.E.

Village	Shahnún	40°	2½ miles distant.
„	Kayimabad	85	2½ „
„	Zergheran	110	1½ „
„	Banúch	135	2 „
„	Berglan	225	2 „
„	Bakhterherd	320	3 „
„	Shemshabad	315	2½ „
„	Tizab	300	3 „
„	Berab	295	3½ „
„	Dehekestan	275	5 „
„	Múbarekabad	260	3 „
„	Dowletabad	260	10 „
„	Kara Kaj	250	5 „

Village Nussrawan	245°	4 miles distant.
„ Búrj Diringhaneh	244	8 „
„ Shahijan	230	2½ „
„ Júrzan	250	1½ „
„ Biadeh	218	½ „
„ Herbadan	215	2½ „
„ Dermenjan	188	1 „
„ Khúngab	165	2 „
„ Deh Kheir, Pain	100	10 „
„ „ Balla	95	10 „
„ Siahán	68	3 „
„ Deveran, not visible but close to Siahán.		
The Kúh-e-Nemuk, or Mountain of Salt ..	318	5 „
The Kúh-e-Múmiá	235	10 „
The ancient sculptures	65	3½ „

The villages of the plain are generally small and poor, and are said to contain in all only 1000 families. Those of the hills are finer, but few in number. In all the district the villages and hamlets amount to about 64.

The sculptured rocks, called by the Persians the Nakhsh-e-Rustum, are the next curiosity I visited. A large tablet of figures is sculptured on the face of the rock, executed with great care and beauty, and have been supposed to represent Shahpúr and the captive emperor Valerian; but there are two captives who seem to be presented to the sovereign by a Persian. The king is mounted on a charger, which steps over a prostrate body; his face has been a good deal injured, but he wears a high globe on his head, and has royal flammings; his left arm is extended towards a figure apparently of a Roman, on whose head (slightly inclined) he rests his hand in an encouraging manner; with his right hand he holds something like a sceptre. A second figure, dressed also like a Roman, with bare head and short hair, advances towards the right side of the horse, extending his hands as in supplication. This figure is seen in its whole length, whilst only the upper part of the other one, just described, is visible. Behind the two stands a Persian with flowing robes and long hair or a wig. The rest of the figures on that side of the tablet, amounting to about 27, have high Roman noses, bare heads, and short hair. In the corner a horse and the wheel of a chariot are observed.

Behind the king are 16 figures—some in wigs, some in high and peculiar head-dresses, the summit of each projecting in front so as to resemble the crest of a helmet at a distance; others have straight, high head-dresses, rounded at the top; and one of these last appears to be holding the king's horse by the tail; some of these figures wear anklets. The whole of this group is of colossal size. At the foot of the tablet is a copious spring of very clear water, which forms a deep pool abounding with fish. These sculptures, I

believe, have been described by Christie, but I have never seen his work.

Skirting the hills from thence in a direction nearly s.e., we came to what the people termed a caravansarai, excavated in the solid rock, and situated at about 3 miles from the town. It appeared to me to have been intended for a mosque, the mehrab or niche, to denote the direction of the kebleh, being in its proper position. Over the entrance are some ancient Arabic characters much defaced, and around the mehrab similar writing. The interior is a square with a passage round three sides of it, and the four corners occupied by rock cut into passages which leave nine square columns in each. The rock has been neatly excavated, and the place overlooks the site of the ancient town called Shehr Jenet, which was situated about a mile to the s.e., but of which I could perceive no remains.

The Bagh Eram is the site of an ancient place, situated at some 4 fursacks from Darab to the e. or s.e., which I did not visit; there does not appear to be anything in the shape of a building remaining there.

From Darab to Jehrúm are	..	18 fursacks	=	63 miles.
„ Buudi Abassi	..	62 „	=	217 „
„ Eej .. ..	..	8 „	=	28 „
„ Istahvonat	..	12 „	=	42 „
„ Neyriz .. ..	..	12 or 13	=	42 to 45.

26th March.—From Darab I proceeded towards Jehrúm; our first stage was made as follows:—

1½	mile W.	
¼	„	245°
¼	„	265
¼	„	235
¼	„	252
½	„	235
¾	„	245
⅝	„	260 to village Berghan.
½	„	220
¼	„	230
1;	„	220
3	„	250 to village Dehekestan.
1	„	to ruinous bridge over small but deep stream flowing from the N.
2	„	290
¾	„	285
⅝	„	295
¾	„	297
¾	„	320 to village Kiassi,

where no provender for our cattle being procurable, we passed onwards ¼ a mile on a bearing of 310°, ⅓th mile 295°, and 2 miles

335°, to the village Madaoun, from whence Darab bears due E., 4½ fursacks distant. At both these last villages the extremes of poverty met the eye. Much of the plain is covered with fine turf on this side; the heat very great.

On the 27th March I proceeded on the bearings given in the margin,* immediately passing through low rocky hills into a small plain clothed with tufts and bushes; some of the latter bear a long pink globe with a small flower at the extremity, which indeed is observed in many parts of the Ghermsir. Subsequently we entered amongst low hills by a bad road, leading in a general direction of 295°; a scattering of the benneh-tree and swarms of locusts were the only objects to notice. We then entered upon a more open country, and again traversed a tract where fossil-shells are found. Subsequently the road led through ravines, which brought us into a fine plain belonging to the district of Fessá, extending in length some 15 miles from N.W. to S.E., by about 5 miles in breadth; it is covered with fine turf and tufts, in which the sand-grouse greatly abound at this season. We finally reached Nussirabad, outside which we found the tents of the governor of Darab, Jehanghur Khan, who presently called on me, and we discussed together some roasted francolins which he brought with him.

This village possesses, in common with others of the plain, some palm-trees. I took the following bearings from it:—

Village Mian Deh ..	330°	2 miles distant.	
„ Zahidan ..	315	4	„
„ Kharinjan ..	330	6	„ not visible, but its position pointed out.

* *Distances and bearings.*

¼ mile	245°	¼ mile	290
¼ „	235 to low rocky hills, and through thence into small plain by slight ascent.	½ „	270
¼ mile	260°	⅙ „	280
7 „	275 when we quitted plain, and passed amongst low hills.	¾ „	270
⅞ mile	295°	¼ „	290
¾ „	260	1½ „	250 by descent.
1 „	270	1½ „	240
½ „	235 across a plain.	¾ „	210 through ravines.
1½ „	240 by gentle ascent.	¼ „	220
⅓ „	270	⅙ „	240
¼ „	255	⅓ „	200
2 „	265	⅓ „	250 reach fine plain.
⅓ „	250	2 „	240
1 „	255 over low hills, in which fossil shells occur.	2½ „	250 to village of Nussirabad.
¾ mile	265° over open country.	—	
¼ „	260	28½ miles.	

The distance, however, is called only 7 fursacks. We found no water on the road during this march.

Village Kúshkh .. 10 5 miles distant, belonging to Jehrúm.
 Direction of Jehrúm, as pointed out, 215° .
 Kaley Terrere Padshah, ruins on a high mountain apparently almost inaccessible, 155° , 10 miles distant.
 Kaley Kafer, 260° , $1\frac{1}{2}$ mile distant, a few remains at foot of hills.
 Fessá is 15 fursacks from Nussirabad.

28th March.—Yesterday five or six mounted plunderers of the Baharlú tribe made a foray on the neighbouring village of Kúshkh and drove off 50 head of cattle. The villagers made their complaint to the governor, who sent a party of horsemen in pursuit, which, coming up with the plunderers, killed two of them, recaptured the cattle, and took from the culprits all they could lay hands on. The pursuers had a blood-feud with the plunderers, which accounts for their having killed two of them.

We proceeded from Nussirabad* and crossed low hills extending into the plain from the west, and entered the district of Jehrúm. At the 4th mile we passed the village fort Kúshkh, and at the 7th rounded the hills to our right, and, quitting this corner of the plain, entered a broad valley. The 8th mile brought us past the small village Kamshi, and, $\frac{1}{2}$ a mile beyond, to the ruins of the village Chehar Tagh, where there is a pretty grove of palm, pomegranate, and fig-trees, under the shade of which we breakfasted. On a neighbouring height is seen an old domed building in the

* Distances and bearings.

$\frac{3}{4}$ mile 190°	$\frac{1}{4}$ mile 260 to broad dry bed of stream, called Rúd Khaneh Shúr, flowing from N.W. to S.E. at certain seasons only.
$\frac{1}{4}$ „ 225	$\frac{1}{2}$ mile 265°
$\frac{1}{4}$ „ 180	$\frac{1}{4}$ „ 250
$\frac{1}{4}$ „ 190 across low ridge of hills extending into plain from w. Enter district of Jehrúm.	$\frac{1}{2}$ „ 285
$\frac{1}{4}$ mile 195°	$\frac{3}{4}$ „ 295
2 „ 190 to near village of Kúshkh.	1 „ 265
2 $\frac{1}{2}$ mile 195°	1 „ 250
$\frac{1}{4}$ „ 210 enter broad valley.	$\frac{3}{4}$ „ 245
1 „ 235 past village Kamshi.	$\frac{1}{2}$ „ 240
$\frac{1}{2}$ „ 250	4 „ 225
$\frac{1}{4}$ „ 270 to ruins of village Chihar Tagh.	1 „ 200
$\frac{1}{2}$ mile 275°	1 „ 215 and pass village of Hyderabad.
$\frac{1}{4}$ „ 270	$\frac{1}{4}$ mile 215°
$\frac{1}{2}$ „ 260 enter another plain.	$\frac{1}{4}$ „ 195
$\frac{1}{2}$ „ 265	$\frac{1}{8}$ „ 220
$\frac{1}{2}$ „ 250 to Bab Arab.*	$\frac{1}{2}$ „ 205
$\frac{3}{4}$ „ 270	$\frac{1}{8}$ „ 210
$\frac{3}{4}$ „ 265	2 „ 220
$\frac{1}{4}$ „ 277	$\frac{1}{4}$ „ 225
$\frac{1}{2}$ „ 260	1 $\frac{1}{4}$ „ 245 to Jehrúm.
$\frac{1}{2}$ „ 270	—
$\frac{3}{4}$ „ 250	29 $\frac{3}{4}$ miles.

style of a tomb. After this the valley expanded, and we entered another plain, and, at the $10\frac{1}{2}$ mile, reached Bab Arab, a rather pretty village. The eastern half of this plain is uneven, and of extremely stony and unprofitable land; the length is from E. to W. The 25th mile brought us near the village Hyderabad, and thence $4\frac{3}{4}$ miles to Jehrúm. Distance reckoned at 8 fursacks, or 28 miles. My reckoning gave $29\frac{1}{4}$ miles.

The land around Jehrúm is principally irrigated with water drawn from wells by bullocks, with which the plain is everywhere dotted. The scarcity of running water is extreme. The town consists of a walled fort of great length, and in good condition, situated near rocky mountains, which lie on the S.E. of it, and extend in a direction about E. and W. The situation, as marked in Arrowsmith's Map, is evidently much too far to the S. relatively to Fessá and Darab. I was here most hospitably received and entertained by Hadji Aly Naghi Khan, the brother of the governor, then absent. The town is said to contain within and without the walls 3000 families. The walls are of recent construction, and are about 3 miles in circumference; but there are more houses outside than inside them. Many of the habitations possess turreted towers as places of defence. The people appeared to be a civil race.

This is the principal mart for tobacco, which is brought here from all the surrounding districts, and disposed of to traders, who distribute it over the country far and near. These traders are numerous, and many established here are wealthy; they usually transact their business in their private houses, without resorting to the caravansaries, of which there are six in the place. A merchant gave me the following rough estimate of the produce of tobacco in some of the neighbouring districts:—

Muns of Gabbassi = 720 miscal.				Prices.
Laristan .. .. .	..	..	..	Keran 1s. to 1s. 10d. per mun.
Joyoum and Bidshehr ..	50,000	..	..	.. 1s. for Joyoum.
.. .. .	..	..	..	.. 1s. 10d. for Bidshehr.
Ala merdesht	65,000	..	..	.. 1s. per mun.
Kir and Kazin	25,000	..	..	.. 10d. per mun.
Gheledar and Assir ..	50,000	..	..	.. 1s. per mun.
Lazher Mekan, Afzer, and Kowreh	50,000	..	..	.. 1s. 10d. per mun.
Jehrúm	30,000	..	..	.. 1s. to 1s. 5d. per mun.

The other articles of native produce which enter into the trade of the place are dates and rice of Kir and Kazin. The former are worth at Jehrúm Kerum 9s. to 14s. for 25 muns. The rice, of which there may be 150,000 muns, sells at 1s. for 2 muns.

Some 30,000 to 40,000 tomans worth of English cottons, imported from Tehran, are disposed of annually at Jehrúm. There

are 30 dealers in these goods here. Groceries, spices, and cotton manufactures are brought from India by Bunder Abbassi, Assalú, and Bushir.

Grapes, dates, water-melons, pomegranates, figs, plums, apples, and fruits of the orange and lemon species, grow here abundantly; the first named are very excellent, and sell at the ridiculously low price of 1 shaki (a halfpenny) for 720 miscals, or about 7 lbs. A considerable quantity of raisins is exported to India.

Barley and wheat are not produced in this district in sufficient quantity for the consumption, in consequence of the scarcity of water. There is a salt-mine a fursack distant to the west.

The district of Jehrúm measures about 8 fursacks by 4, and contains 18 villages.

30th March.—On quitting Jehrúm* we proceeded along the plain and crossed some low hills, 2½ miles w. of the town. This brought us into a valley, through which we passed by a very rough road. At the 4th mile we crossed some mountains by a bad and difficult pass, called Gúdar Naal Shiken (the Destroyer of Horse-shoes), from whence Jehrúm bears 75°. A few minutes' labour brought us to the summit. These mountains extend n.w. and s.e.,

* Distances and bearings.

½ mile 230°	pass; more fossils observed; enter Kazin.
1 " 240	½ mile 180° to a second descent over very rough ground.
½ " 230	½ mile 155°
¼ " 250	½ " 180
¼ " 250 cross low hills.	½ " 230
¼ " 250	¾ " 250
⅛ " 300	⅛ " 215 through narrow rough valley.
¼ " 290	¼ mile 180°
⅛ " 310	¼ " 135
½ " 255 through rough valley.	¼ " 120
¼ " 280	½ " 210 and 254° by exceedingly bad road.
¾ " 250 ascending over mountains, and a difficult pass to summit of ascent.	¾ mile 295° here fossilized rock.
1½ mile 285° descent through broad valley; numerous fossils strewn the ground.	¾ " 275
1 mile 260°	½ " 180
1 " 255	½ " 130 thus far descending.
¼ " 215	¼ " 225 ascent over bare rock.
½ " 220	¼ " 190
⅛ " 190	½ " 170 by descent towards plain of Múbarekabad.
⅓ " 215	½ mile 210° along plain.
¾ " 225	½ " 225
¾ " 205	1 " 215
⅛ " 225	½ " 290 to Múbarekabad.
⅛ " 240 to the pass of Kassettú.	
¾ " 240 descending the above	

18 miles.

and $\frac{1}{4}$ ths of a mile N. of them is a parallel range ; but neither is of great height. In descending on the other side I observed numerous fossils of thick oval shells, about the size of the hand, strewing the ground ; further down were thick oyster-shells, scalloped bivalves, and a few sponges, all fossilized. The descent led us through a broad valley, which finally terminated in a country of low hills and valleys. The $10\frac{1}{2}$ mile brought us to another pass, called Kassettú, which led us by a descent into the district of Kazin. More fossils are observed in this district. One mile further brought us to a second descent, over very rough ground, and we entered a narrow rough valley over the worst piece of road I have ever encountered ; our horses, though led, were scarcely able to maintain their footing, and plunged violently. I observed at this part a curious formation of fossilized organic rock, seemingly composed of a bed of polipi, in thickness rather less than the little finger. At the 16th mile we descended towards the small but pretty vale of Múbarekabad, extending E. and W., and generally covered with green turf, and bushes principally of the kúnar. It is several miles in length, but of inconsiderable width, probably not more than $1\frac{1}{2}$ mile. On reaching it very heavy rain set in, and continued until we reached Múbarekabad to discover that the place was utterly abandoned, not a soul remaining in it, the villagers having deserted it in a body at sight of a cannon lately brought across the hills for the service of the Eel Begghi. They probably feared being impressed to drag this gun, or being exposed to other violence from the followers of the great man. Their houses, some few articles of provisions, and their green crops, were all deserted, to be appropriated by every passer-by. We caught three men belonging to a karagúzlú encampment, and hearing from them that Múbarekabad swarmed with fleas of unusual dimensions, this and its deserted state led me to comply with their suggestion of proceeding to their tents at some distance to the east, and we were conducted from encampment to encampment ere we procured shelter in part of a tent reluctantly yielded up to us. The heavy rain which was falling made us glad to procure the imperfect shelter of this tent, which, like all Eeliat habitations of the kind, was of black goats' hair, so coarse in texture and so full of apertures, that not only a shower of mist penetrates, but the water streams in at the roof. The women busied themselves in digging a trench around the tent to prevent its being swamped, and I sat wet through for two or three hours in considerable anxiety as to the fate of my baggage, to intercept which I had despatched people in several directions, but could obtain no tidings of it ; I therefore determined on returning to the village in search of it. The weather had cleared up in some measure, and vivid flashes of lightning enabled us to pick our way through the darkness along the plain.

On approaching the village, a shrill whistle was heard as if proceeding from a small grove of palms near it, and as we had heard no shouts in reply to the firing we had kept up along the way, I conceived that perhaps we were waylaid. We put ourselves in readiness to receive and repel an attack ; but reaching the village, had the satisfaction to find baggage and people safely housed there. I passed the rest of the night on the housetop.

On the 31st March we continued our way along the vale, which extends on a bearing of 290° , and at this season affords excellent pasturage.* The flocks I observed in this part of the country belonged to the tribes, and were mostly of sheep and lambs, with a greater proportion of white fleeces than in other parts I had lately visited. The goats, however, were usually black or brown. Towards the 6th mile the valley had shrunk to about half a mile in breadth. We occasionally passed a few black tents of the Cashghau tribe, and, at the above-mentioned distance, passed the small village Gherghaoun, 1 mile to our left, inhabited by a race called Kúlú, who, I was told, are descendants of negroes. The 12th mile led us to Alliabad, a ruinous village containing only five or six families, and an imamzadeh of Sheikh Rustum, the brother of Shah Cheragh, a miserable-looking mud building. The

* Distances and bearings.

$\frac{1}{2}$ mile 260°	$\frac{1}{2}$ mile 290°
1 " 270	$\frac{1}{2}$ " 320 to river.
$1\frac{1}{2}$ " 280	$\frac{1}{2}$ " 305
1 " 285	$\frac{1}{8}$ " 320
$\frac{1}{4}$ " 265	$\frac{1}{4}$ " 350
$\frac{1}{2}$ " 280	$\frac{1}{8}$ " 300
$\frac{1}{2}$ " 300	$\frac{1}{8}$ " 350 to bank of do.
$\frac{1}{8}$ " 305	2 " 280 parallel with above
$\frac{1}{8}$ " 270	river; here we passed village of
$\frac{1}{4}$ " 320	Liferjan.
$\frac{1}{8}$ " N.	$\frac{3}{4}$ mile 270°
$1\frac{1}{2}$ " 300	$\frac{1}{4}$ " 250 skirting hills.
$\frac{1}{4}$ " N.W.	$\frac{1}{4}$ " 230 to date grove.
$\frac{1}{4}$ " 295	$\frac{1}{4}$ " 215 to village Pedan.
$\frac{1}{8}$ " 305	$\frac{1}{3}$ " 245 to Kaleh Kúlú Kel-
$\frac{1}{2}$ " 295	lahi.
$\frac{3}{4}$ " 275	$\frac{1}{2}$ mile 290°
$\frac{3}{4}$ " 295	$\frac{1}{3}$ " 265
$\frac{1}{8}$ " 310	$\frac{1}{8}$ " 270
$\frac{1}{8}$ " 295	$\frac{1}{4}$ " 280
$\frac{1}{8}$ " 285 near to Gherghaoun.	$1\frac{1}{4}$ " 280
$\frac{1}{8}$ " 315	$\frac{1}{8}$ " 255 to palm grove.
$\frac{1}{8}$ " 310 to Alliabad.	$\frac{1}{2}$ " 255 to Segdawan.
$\frac{1}{4}$ " 310	$\frac{2}{3}$ " 190 to camp of Eel
$\frac{1}{4}$ " 345	Begghi.
$\frac{1}{2}$ " 300	—
	22 $\frac{1}{2}$ miles.

13½ mile brought us to a river, flowing N. and S. for a short space, about 100 yards in breadth, and in parts nearly up to the horses' girths. This stream, known near its source as Karaghadj, flows to Siakh, Kewar, and Khafr, where streams from Jehrûm and Simkau join it, and thence it pursues its way to Kir and Kazin, and Dizzar of Gheledar, where a stream from Firûzabad enters it, after which it falls into the Persian Gulf between Kenghan and Assalû. It is variously named, being called successively after each district it passes through.

From this point I obtained some bearings:—

The district of Afzer lies 3 fursacks off on a bearing of 240°. It joins that of Bidshehr, situated nearly S. of this and Joysum still further south, all these lying behind a high range of mountains bounding this plain in that direction.

Village Pûst Ass	1½ mile distant ..	220°	} All possessing groves of palms.
" Karzin	2 ..	265	
" Vijeshkh	1½ ..	240	
" Liferjan	2 ..	300	

After fording the river, we presently came again to its right bank by a bend it had taken, and proceeded near and parallel to it, but with a high ridge of rocks between it and us for about two miles, when we passed the remains of a fort in those rocks, called Perr Aly, and the village Liferjan. The rock is here pierced in two parts to admit of the water of the river being drawn off for irrigation. Thence we skirted the hills on our right for three-fourths of a mile, which brought us to the village Pedom, with its beautiful groves of palm, orange, and lemon trees, in which nightingales and other birds were singing in charming chorus, and the air was perfumed with the sweet blossoms of orange groves. The village, as usual, was a ruinous collection of hovels. This part of the plain is extensively cultivated, and has a very pleasing appearance with its fields and groves. The 18½ mile brought us to the groves and ruined village of Kaleh Kûlû Kellahi, near which rises a remarkable-looking rock; then passing more groves we reached, at about the 20th mile, the village Kûrshû, partly in ruin, but possessing also extensive plantations, and half a mile beyond the village of Segdawan. Thence we made about two-thirds of a mile to the camp of the Eel Begghi, near which I was met by his nephew and a numerous party of horsemen. The camp was pitched amidst a grove of palm-trees, and here I was kindly welcomed by the chief, whose name is Mohamed Kady Khan, a brother of my friend the Eel Khanî of Fars, a very well-bred and extremely kind and hospitable person. I found him engaged in besieging the small fort of Purghan, situated on a mound, and one of the strongest places of the kind in this vicinity. It has been held for many years by the family of Kerrim Khan, a súnîe chief of Bidshehr, at present

in rebellion, and it is the place where the former Eel Begghi, brother of the present one, was treacherously murdered about 22 years before by order of the firman, Ferimah Hussein Aly Mirza. He was ordered to meet another officer, named, I think, Baba Khan, under pretext of concerting measures for the reduction of Lar. Baba Khan paid him a visit, which unsuspectingly he returned with about 30 attendants only. When in the fort he was told that an order for his arrest had arrived, upon which he drew his dagger and gallantly fought his way through his opponents, wounding or killing several; but on attempting to leave the fort he received three gun-shot wounds and was presently secured, but died of the injuries he received. His brother spoke of him in terms of high praise and admiration. He appears to have been a splendid fellow, of athletic make, and greatly esteemed for his gallantry. Kerrim Khan's tribe assisted in his capture, and, being summoned by the Prince Governor of Fars to surrender their fort to the present Eel Begghi, they were apprehensive of the latter retaliating on them the murder of his brother. The garrison of this small place consisted of about 120 musketeers, and, as they were well supplied with ammunition and provisions, the reduction of the place by such a force as the Eel Begghi's was doubtful. That force consisted of some 2000 men of his tribe and one gun (a 12-pounder); but he had but a scanty proportion of ammunition, half of which he had already expended in battering one of the towers to very little purpose, and when I arrived he had entered into negotiations with the defenders. The eastern ground on which the fort stands is encircled by a dry ditch: the walls and towers were in good condition, and believed to be rendered doubly strong by having embankments of earth raised against the former within, and cramming the latter with the same material. The Eel Begghi consulted me as to the mode of reducing this fort. I recommended his mining it, seeing the immense strength of the walls and the little effect his firing had produced on them, and he immediately took measures to effect this. I may also mention that the gateway of the fort having a small square building inside, the latter had also been filled with earth so that shot would produce little effect on it.

The Eel Begghi's camp was composed chiefly of canvas tents, and he himself occupied a handsome one and was surrounded by his dependents, amongst whom he is a little sovereign; still his rule is a patriarchal one, and he appeared to be highly popular.

The plain of Kir and Karzin has a pleasant appearance, owing to the turf with which it is clothed and its numerous palm groves. It possesses 23 villages, and is an intensely warm district in sum-

mer, and then forsaken by the tribes, though its other inhabitants remain in the villages, suffering, however, greatly from the swarms of flies which infest the country, and from sore eyes. The produce is barley and wheat, rice, tobacco, sesamè seed, and excellent dates. The dooraj or francolin abound on the plain. The village Kir is situated at three-fourths of a mile N.W. of the spot on which the Eel Begghi's tent was pitched. The district of Simkan lies N.E.; its chief village, Dúzeh, being at 6 fursacks from Kir. That of Gheledar, near the Gulf, is 30 fursacks S.S.W. of Kir. The partridge* Jirúpti is found there.

The Kashghai and Khalij tribes, both of Turkish origin and residing together, are those over which the Eel Begghi's family have held an hereditary authority for some generations past. The former is in about 30 principal divisions and numerous subdivisions; the Khalij are in 7 principal divisions. These two tribes yield to the state about 10,000 tomans (4500*l.*). Their numbers are too variously estimated for me to form a decided opinion on the subject. The Eel Khani and Eel Begghi reckoned them at 5000 to 6000, and I should doubt the truth of any very high valuation of their numbers from what I saw of them in my wanderings. The Eel Begghi stated the Kashghais to be the descendants of a race transplanted by Húlakú from Kashgar, in Tartary. The wealth of this tribe is in sheep and goats, horned cattle, horses, and asses; but they possess few camels. The wool of the sheep and goats is all required for the use of the tribe, who work it up into articles of clothing, camp-equipage, horse-coverings, and carpets. A small portion of it is of fine white; but perhaps half that produced by the sheep is of a dirty white. The goats are chiefly black or red. Some of the sheep are of remarkable size, frequently weighing, I was told, 18 to 20 muns of 720 miscals = 130 to 144 lbs.

The other tribes of Fars, the Arab, Baserri, Nepper, Bahaslú, Aynarlú, and Chehardeh Chehrik, are also under the Eel Begghi's authority, and yield 13,000 tomans as revenue to government. They are all considerable tribes, and, like the others, split into many small divisions.

The Eel Begghi assured me the whole of the tribes of Fars do not exceed 20,000 to 22,000 families, exclusive of the Mamsenni, whom he reckoned at 2000 families.

Of tribes on the confines of Fars he estimated the Bakhteari at 30,000 families, and the Feyli or Lour Búzourk at 100,000 families—both probably exaggerated accounts.

The tribes in these countries appear to be generally composed in great part of very poor families. They pay so little attention

* *Perdix Pondicerianus.*

to agriculture, that after their own immediate wants are supplied, the produce derived from their flocks and herds remaining over will not keep them out of poverty, and much of it is absorbed by government taxes and the impositions of their chiefs. With all this they prefer their free condition to the more easy existence in towns.

The tribes are rarely seen in any large body in one spot; the scarcity of pasturage obliges them to separate into small encampments of from 5 to 50 tents; rarely in hundreds. They occupy the plains, valleys, and ravines of the skirts of hills, and are thus scattered over the face of the country, each little community living independently of the rest. In the cold season they spread themselves over the Ghermsir.

Talking with the chief respecting Europe, he expressed surprise that we should possess no Eeliats or tented tribes, and remarked that, of course, there could be few sheep or oxen in such countries. Referring to a book, I told him that in England there were 60 millions of sheep and 33 millions of horned cattle. This set him and others present calculating the number of sheep amongst the tribes, which they seemed to think would not exceed half a million.

I had heard before, and the information was here confirmed, that inoculation has been known amongst the tribes of Fars for centuries. The operation is performed on children at the wrist, and unless the pock makes its appearance in a general eruption over the body, it is not considered effective, and the operation is repeated. When thus induced, the disease is said to leave no mark. The cow-pock is, however, unknown amongst the tribes.

The besieged came to terms on the 2nd April, and sent in two hostages. They were to give up the fort and all their ammunition, and were to be allowed to retire unmolested. My presence innocently enough led to this result; for one of the Eel Begghi's people, having been sent to parley, assured them that an English Sahib Munsub, who had arrived, had just been showing his master how to take the fort in two hours, upon which they came to terms. In the evening I rode down with the chief to the battery of one gun (an English 12-pounder), within a very short distance of the place, and although we were completely exposed for some time to the enemy, who crowded on the walls, they were so obliging as not to fire on us.

After I had quitted the camp I learnt, however, that the garrison had broken faith with my friend, and that he had recommenced the siege, but had been ordered by the Governor of Fars to desist.

On the 3rd April I quitted the camp of my polite and kind friend, who sent me some horses, begging me to select one for my

own riding. I then proceeded to the village Kir,* and thence over stony ground, the plain lessening as we advanced westward, and may be said to terminate at about the $6\frac{1}{2}$ mile west of Kir. We then ascended between parallel ranges of hills for about 4 miles; then descending about 2 miles by an execrable road through a valley, entered a partly-cultivated vale, possessing palm groves, a little stream, and a growth of reeds, &c. The $12\frac{1}{2}$ mile brought us to the village Bagh Pesserler, then deserted. Presently after we crossed hills and undulating country, more or less clothed with bushes and a sprinkling of the benneh tree. At about the 20th mile we ascended through a pretty vale, in which there was abundant pasturage, and consequently numerous scattered encampments of Eeliats. The little hamlet of Babonej, with garden-land attached, occurred at the 25th mile. Close by was a high mound, on which stands a stone octagonal tower and another hamlet, with date groves, scattered winter-houses, and extensive stabling, all belonging to the Eel Begghi, who resorts to this spot in the cool weather. One and a half mile over low hills brought us into another small rough plain, in which we found an encampment of the Eel Khame's family, consisting of a few black tents and one of canvas; but on arriving there the people seemed not to have expected us, and as they made some demur to our expressed wish for quarters, I passed on, hoping to find shelter from a broiling sun in some other encampment; but this effort also failed, and there being no other habitation near, we turned back to Babonej and made ourselves at home in an empty house there. Here we could obtain nothing in the way of provisions excepting some green barley for our horses.

This vale belongs to the district of Eebek-eh (or the Four), so named from its having originally possessed 4 villages, though now there would appear to be 9, namely: Hangúm, Búlasker, Punj Shir, Rúdbal, Borrazghan, Ser Túl, Deh Rem, Babonej hamlet, Dehrúd. The district is of considerable extent and very mountainous.

* *Distances and bearings.*

1 mile.. .. 315° to Kir.	1 mile.. .. 280°
$\frac{3}{4}$ " 285	1 " 290
$\frac{1}{2}$ " 320	$1\frac{1}{2}$ " 300
$\frac{1}{4}$ " 305	$\frac{1}{2}$ " 270
$\frac{1}{8}$ " 270	2 " 290
$1\frac{1}{2}$ " 280	$\frac{1}{2}$ " 300
$\frac{1}{4}$ " 270	$1\frac{1}{4}$ " 270
$2\frac{1}{2}$ " 275 plain terminates.	$2\frac{1}{2}$ " 280 ascend through a
3 " 280 ascending between	pretty vale.
parallel ranges of hills.	$\frac{1}{2}$ mile.. .. 270°
1 mile.. .. 295°	$\frac{3}{4}$ " 275
1 " 295 by descent.	$\frac{1}{2}$ " 300
$\frac{1}{4}$ " 190	$\frac{1}{4}$ " 280 to Babonej.
$\frac{1}{2}$ " 230 enter valley.	—
$\frac{1}{3}$ " 270 to Bagh Pesserler.	25 miles.

4th April.—We were off this morning ere the day had well opened.* At the end of the 2nd mile we ascended through hills by

* Distances and bearings.

330°	1 mile 300°
300	1/4 " 285
340	1/8 " 290
"	1/8 " 310
330	1/8 " 290
290	1/8 " 310
270	1/3 " 285
325	1/3 " 320
Ascend over mountains in general direction N.E. for	
3 miles.	1/4 " N.
1 mile, between S.E. and N., descending.	1/8 " 305
340°	1/8 " 280
30	1/4 " 300
320	1/4 " 340
350	1/2 " 285
90	1/4 " 285
N.	1/4 " 300
90	1/5 " 290
135	1/8 " 210
30	1/2 " 290 to a little ravine full of trees.
110	1/6 mile 60° through a remarkable mountain pass.
10	1/2 mile 90°
70	1/6 " 25
340	1/4 " 350
135	1/4 " 330
N.	1/6 " N.
135	1/4 " 45
340 to foot of descent.	1/2 " 90
45	1/4 " 45 to N., and enter vale of Tidesht.
90	1/4 mile 350°
45	1/4 " 340
315	1/8 " 330
315	1/6 " 320
290 descending into vale through which the Firúzabad river flows southward.	1/3 " 300
300°	1/5 " 305
285	1 " 295
296	1 " 300
310	3/4 " 295
290	1/4 " 315
310	1/2 " 330
285	1/6 " 320
320	1/5 " 320
N.	1/8 " 320 } across plain of Firúzabad.
45	1/3 " 330
90	1/2 " 310
45	1/6 " 305
315	1/4 " 330
315	2/3 " 320 to Firúzabad.
290	

29 2/3 miles.

29 $\frac{3}{4}$ miles.

a stony hard road ; and towards the 3rd mile commenced a great ascent over mountains, the road varying so much as between N. and s.e., but extending in a general direction of n.e. across the hills for a distance of about 3 miles. This is a very difficult pass, the road leading generally over bare slippery rock, on which the cattle scarcely maintain a footing, and where ledges of rock crossing the path or steep rises and falls add to the difficulty. Here we overtook numerous small divisions of Eeliats, moving across with their cattle, flocks, and other property. The sheep and goats moved together in large flocks ; the asses, oxen, camels, dogs, and the men, women, and children, were all mixed up together ; the three last trudging on foot or occasionally mounted. Sometimes the children were intrusted with the care of young kids or lambs, which they carried in their arms ; others were strapped on the backs of the beasts, and seemed perfectly at their ease. The road was so encumbered with the tribes and their property that we were much delayed. In Persia it is considered unlucky to pass through a flock of sheep ; my people were always at infinite pains to avoid doing so, by shouting at and driving the flocks together and making circumbendibuses to get out of their way. Here, however, they were fairly puzzled from the narrowness of the path and the propensity of the sheep to spread, so that they presently gave up the attempt to pass them in despair.

We descended towards the end of the 6th mile. Close by our left was a broad and magnificent chasm, through which the Firúzabad stream flows southward ; the mountain split in twain by some great convulsion, leaving the sides of the gulf in some parts several hundred feet in perpendicular height, each projection of the one side having a corresponding cavity in the one opposite, so that were the rocks brought together again they would fit accurately the one into the other. The scenery, as we descended, increased in grandeur, and the path leading constantly over bare, slippery rock and dangerous inequalities made it frequently necessary to dismount. Towards the 11th mile we reached the termination of the descent, where the Firúzabad stream enters the deep chasm. This is a fine, clear rivulet, pretty at this part, and perhaps 30 paces wide, and is here joined by a streamlet from the n.w. We breakfasted at this spot, and watched the Eeliats as they gradually descended the heights. Such journeys across difficult passes in heat or cold, and over tracts sometimes destitute of water, must, one would suppose, be too much for the aged and infirm, and must frequently hasten dissolution. I observed several aged people of the tribes being taken across who appeared to possess barely strength enough to maintain their seat, and some were stretched on the ground to rest, their sons or daughters roughly though dutifully affording them assistance and attend-

ance. I had seen nothing yet amongst the females of the tribes approaching to good looks, and they are usually disfigured by the filth and rags in which they are clad. There is nothing feminine in their appearance, and it is said that any one of them is as good as a man in a fight. They certainly sometimes possess lungs which would do credit to a Stentor.

All the country we had passed thus far to-day was more or less sprinkled with bushes, amongst which the wild almond was conspicuous.

We made a slight ascent, and then got into the vale through which the stream flows and ascended by it. The hills on our left, having a northerly aspect, were slightly dotted with green turf; this and the vale itself, which is under cultivation, and the bushes along the stream, rendered the ride a very pleasant one. The 20th mile brought us to a small ravine full of trees and myrtle-bushes, close to which is the small village of Rúdbal, one of the Eebek-eh. We then proceeded through a fine and very remarkable mountain-pass, some 250 yards in breadth, the rocks on either side rising to an elevation probably of 500 feet, and, for the most part, nearly perpendicular. This led into the vale of Tidesht, at the 22½ mile. It is 1½ to 2 miles in breadth, runs from N.W. to S.E., and is for the most part under cultivation. The district of Meymen lay between N. and N.E. of this, beyond high mountains. The vale is interrupted towards its north-western extremity by a line of hills running a short distance through its centre longitudinally; and at the 27½ mile, we came abreast of a high rock, rising at the extremity of the vale, to the N.E. of which, at a mile distant, is the small village of Tidesht, lying under the hills. We then made about 2 miles across the plain of Firúzabad, extending N.E. and S.W., a well-cultivated tract of light soil, very free from stone, and reached the cassabeh of the above name, where I was again welcomed by my friend the Eel Khani, who had lately arrived from Shiráz. Firúzabad contains 350 houses, and is surrounded by the remains of a ditch and wall. The Eel Begghi, whose property it is, has a good house and extensive garden here, in which I was accommodated.

At about 2 miles from Firúzabad, in a bearing of 290°, is a site known as the Kaleh Firúzabad, evidently that of a considerable town, its ditch and embankments forming a wide circle, the diameter of which may be about 2400 paces, or nearly a mile. The ditch is 40 or 50 paces wide. In the centre of the area stands a tall, solid square tower, composed of rough stone masonry, 60 or 70 feet in height. It was probably intended as a watch-tower, and appears to have had, on its western side, some other structure attached to it. The only other object of interest on this spot are the remains of a square building which has been

composed of large piles of hewn stone at its four corners, all unconnected, excepting probably by a roof, which is now wanting ; each stone is of large dimensions, and has been secured by clamps which have disappeared. This was probably a place of worship. The rest of the area is strewn with mounds, and the remains of stone buildings, and was then partly occupied by green crops of grain. Macdonald Kinneir has greatly exaggerated the size of this ancient site by stating the ditch to be 7 miles in circuit, whereas it cannot be more than 3.

From the square building I obtained the following bearings :—

Firúzabad	.. ..	110°, about 2 miles distant.
Village Deh Shehr	.. ..	20 " $\frac{1}{4}$ "
„ Bagh Shah ..	.. ..	110 " $1\frac{1}{2}$ "
„ Ser Meydan ..	.. ..	65 " 1 "
„ Ahmedabad ..	.. ..	W. " $1\frac{1}{2}$ "
„ Kilisian ..	.. ..	310° " 1 "
„ Deh Berm ..	.. ..	290 " $1\frac{1}{2}$ "
„ Harún ..	.. ..	235 " $2\frac{1}{2}$ "
„ Mehmedabad ..	.. ..	135 " $2\frac{1}{2}$ "

The district of Firúzabad is said to contain only 700 families and to be two fursacks in extent each way. Some Jews are found here.

The Eel Kkani informed me that here, and in Fars generally, the terms on which land is held are these :—

Land, the private property of the erbab (lord or farmer) is cultivated at his sole expense, the labourers receiving, in lieu of wages, one-fifth of the produce ; out of the remainder the lord of the land accounts to Government for one-third as tax.

When the labourer furnishes seed, plough, and labour, he receives one-third, the Government one-third, and the landowner one-third of the produce.

On crown lands the Government takes two parts of the produce, but furnishes seed and ploughs ; the labourer gets the remainder.

When the land belongs to the rayat or peasant, he cultivates it, giving one part of the produce to Government and keeping two parts for himself.

There are some variations in the above rule, however, according to the relative positions of lord and peasant.

On this plain the land, which appears poor, is not manured, and yields from 3 to 10-fold ; the average 6-fold.

From Firúzabad to Bushire, by Ferashbund, is a distance of about 35 fursacks, or 105 miles ; by Kazeran 62 fursacks, or 186 miles.

I was detained at Firúzabad longer than I had contemplated on account of the state of my horses after the last trying stage.

My best horse had gone dead lame, a second too lame to be ridden, and all of them had their shoes so injured by the rough road as to require fresh shoeing—a work of time at this village, where it had to be done to order. I quitted the place, however, on the 6th of April, and never saw my kind friend the Eel Khani again: he died shortly afterwards, and was succeeded in his office by his brother the Eel Begghi. My road led me on the bearings as in the margin.* The 3rd mile brought us to the defile called the Teng-ab, down which flows the stream watering this plain, and through which the road to Shiráz leads. It is a rocky and rather fine pass, and at about a mile from its entrance is found a tablet of ancient sculpture, situated high up on the face of the rock; it is reached with difficulty, owing to the perpendicular nature of the ascent. Here I found my poor friend Tasker's name engraved on it, and added my own.

The sculptures are of colossal size, and represent two royal personages meeting, and each clasping with one hand a ring; to the ring a flamer is attached, which falls down over a fire-altar of small dimensions, and between the two is a much-defaced Pehlevi inscription, the right-hand side of which I endeavoured to copy.

The left-hand figure in the tablet wears a beard, wig, crown, and royal flamer; the crown resembles a high glazier's cap in shape, wider at top than at bottom, and flat on the sides. The figure holds in one hand a long staff; he has no attendant.

The right-hand figure, evidently the chief personage, wears the large globe on his head, as seen at Nakhsh-e-Rústum, &c.; has a beard, but no wig or hair visible; his left arm is raised, as though in menace. A figure behind him holds over his head a flyflap; has no wig, but wears on his head something very like a Grecian helmet. Three other figures are seen successively behind the last, all with beards and wigs. Thus there are six figures, all on foot.

This tablet is not of highly-wrought sculpture. Near it are the

* *Distances and bearings.*

$\frac{3}{4}$ mile . . . 335° to Ser Meydan.	1 mile return to entrance of pass.
$\frac{1}{4}$ „ . . . 330	$\frac{1}{4}$ „ from entrance of pass, in direction s.w., to the Attesh Kuddah,
$\frac{1}{4}$ „ . . . 310	$\frac{3}{4}$ mile s. to village Ghilak.
$\frac{1}{2}$ „ . . . 340	$\frac{1}{8}$ „ . . . s w.
$\frac{1}{8}$ „ . . . 325	$\frac{1}{8}$ „ . . . 200°
$\frac{1}{4}$ „ . . . 335	$\frac{1}{8}$ „ . . . 260
$\frac{1}{4}$ „ . . . 350 and through hills.	$\frac{3}{4}$ „ . . . s.w. to Kilissian.
$\frac{1}{2}$ „ . . . 335 to corner of plain and defile of Turgab. *	$1\frac{1}{4}$ „ . . . s.w. to Ahmedabad.
1 mile n., and 310° to sculptures.	—
	8 $\frac{1}{2}$ miles.

remains of a stone bridge, and at some little distance lower down the stream a road leads up the side of the valley over slippery rock, which has therefore in one part been cut into steps.

We descended the valley again to examine the remains of the Atesh Gar, or Atesh Kuddeh (Fire-Temple), situated a quarter of a mile s.w. of the entrance to the defile. The tower at Kaleh Firúzabad bears from thence 185° , and Firúzabad 155° . The temple is a vast pile of masonry, composed of walls sometimes of immense solidity, one I measured being about 16 feet thick. Numerous chambers of various sizes have composed the interior, of which three exist with their vaulted roofs, and towards the southern end is a large hall. The walls around the chambers have recesses, with semicircular arches. The plaster and cornices are in many places perfect, but there are no visible remains of altars to denote that this building has ever been what it is reputed to be by the Persians. On the northern side a pond of clear water is formed by a spring rising from its centre.

From the Atesh Kuddeh we proceeded three-quarters of a mile s. to Ghilek, then to the village Kilissian and Ahmedabad, where I bivouacked under the shade of two large sour orange-trees, the stems of which being united, they are called Leili and Mejnún, after the two celebrated lovers in Persian romance. The villages of this plain are generally embosomed in groves of fruit and other trees, but few palms are seen amongst them.

7th April.—From Ahmedabad* we continued along the plain, a

* Distances and bearings.

$\frac{1}{2}$ mile 285	Along the plain of Firuzabad.	$\frac{1}{2}$ mile 285	descending.	
1 275		$\frac{1}{4}$ 235		
$\frac{1}{2}$ 285		$\frac{1}{2}$ 250		
$\frac{1}{2}$ 275		1 270		
$\frac{1}{4}$ 280		$\frac{2}{3}$ 270	through vale.	
$\frac{1}{4}$ 270		$\frac{3}{4}$ 240		
$\frac{1}{4}$ 275		$\frac{1}{3}$ 265		
$\frac{1}{4}$ 245		2 370		
$2\frac{1}{2}$ 255		$\frac{1}{5}$ 315	over hills.	
1 270		1 290		
$\frac{1}{5}$ 315	$\frac{2}{3}$ 300 descending.			
$\frac{1}{2}$ 225	$\frac{1}{5}$ 250			
$\frac{1}{2}$ 215	$\frac{1}{4}$ 280 ²			
$\frac{1}{6}$ 150	ascend over hills covered with bushes	$\frac{1}{12}$ 275	through defile.	
$\frac{1}{12}$ 230		$\frac{1}{8}$ 180		
$\frac{1}{4}$ 260		$\frac{1}{12}$ 250		
$\frac{1}{5}$ 240		$\frac{1}{4}$ 200		
$\frac{1}{5}$ mile 320 by steep and bad descent.		near caravansarai and spring of water.		
$\frac{1}{2}$ mile 270 ² general direction by windings.		20 $\frac{1}{4}$ Carried forward.		

fine tract of turf where not cultivated, as is the case at its western extremity, affording pasturage to sheep and goats, of which I observed, in the space of less than a mile, no less than 15 large flocks, belonging principally to the tribes; among them, however, few purely white fleeces were observed. At the 8th mile we ascended, by a pleasant road, through hills covered with almond and other bushes and a sprinkling of trees. We encountered numbers of Cashghais shifting their quarters, their beasts of burden being chiefly horned cattle, but they had plenty of mares and colts with them. The 10½ mile brought us to a steep and bad descent through a fine pass, very rough and rocky. This opened, towards the 14th mile, into a vale running N.W. and S.E., of which the surface was uneven, stony, and perfectly arid. At the 18th mile we again ascended hills, after crossing which we entered a defile, and alighted to breakfast at the 20th mile, near a building used as a caravansarai; from thence our path led down the defile about half a mile, when we descended hills for about 2 miles, where the road is strewed with fossils of the oyster, scolloped bivalve, and cockle-shells; on one side of the road they were thickly embedded in the soil. Thus far the road had been most difficult, at every five hundred paces leading over rocky, and, to the horses, dangerous, parts. At the 24½ mile we crossed a vale running N.W. and S.E., three-quarters of a mile to the opposite side, when we again descended over very rocky and difficult ground into a recess of the plain of Ferashbund at the 26½ mile, the path continuing over very rough ground. This recess of the plain is about 1½ mile broad, very stony, but with plenty of grass and bushes. We reached the village Ferashbund at the end of

20½ miles brought forward.	½ mile . . . 255 ²
$\frac{1}{8}$ mile . . . S.W. down defile.	$\frac{1}{8}$ „ . . . S.
$\frac{1}{8}$ „ . . . S.	$\frac{1}{4}$ „ . . . 210 across vale running
$\frac{1}{8}$ „ . . . 150	N.W. and S.E.
$\frac{1}{8}$ „ . . . S.E.	$\frac{3}{4}$ mile . . . 235 ² to opposite side of
$\frac{1}{2}$ „ . . . 200 descending hills.	vale.
$\frac{1}{8}$ „ . . . 150	$\frac{3}{4}$ mile . . . 340 ^c by rough descent.
$\frac{1}{8}$ „ . . . 20	$\frac{1}{4}$ „ . . . 270 into plain of Ferash-
$\frac{1}{4}$ „ . . . 225	bund
$\frac{1}{4}$ „ . . . 245	2 mile . . . 265 ²
$\frac{1}{8}$ „ . . . S.W.	$1\frac{1}{4}$ „ . . . 270
$\frac{1}{8}$ „ . . . 250	2 „ . . . 290 hills on left receding.
$\frac{1}{8}$ „ . . . 240	$\frac{1}{4}$ „ . . . 260 off direct road to
$\frac{1}{8}$ „ . . . 270	some tents.
$\frac{1}{4}$ „ . . . 290	$\frac{3}{4}$ mile . . . 320 ² again into high road;
$\frac{1}{2}$ „ . . . 240	hills on right $\frac{1}{4}$ mile distant.
$\frac{1}{8}$ „ . . . 270 here the road strewed	4 mile . . . 315 ²
with fossil shells.	$1\frac{1}{2}$ „ . . . 355 to Ferashbund.
$\frac{1}{4}$ mile . . . S.E.	
$\frac{1}{8}$ „ . . . S.	38½ miles.

38 miles, according to my reckoning; the distance from Firúzabad is reckoned at only 9 fursacks, and from Ahmedabad about 3 miles less. This village is embosomed in palm-groves. The people, on our arrival, were indisposed to give us quarters; their zabít declared there was no available accommodation excepting in a filthy stable-yard. This conduct I resented, and a good deal of squabbling ensued; the villagers collected round their zabít with fire-arms and long heavy-headed bludgeons, and when it was considered there had been a sufficient expenditure of breath in our contest of words, very tolerable quarters were provided.

The plain of Ferashbund, like so many other plains and valleys in Fars, runs in a direction N.W. and S.E., and is said to be about 8 fursacks in length by 1 in breadth. Its soil is generally very free from stones, and its surface extensively cultivated. It is a fine tract, but so ill-watered as to depend for moisture almost wholly on rain. This being uncertain, the produce of the fields varies greatly: wheat and barley seem to be alone raised. The land is never manured or left fallow, but, when new spots are cultivated, the produce is said to be as high as 30 or 40-fold, though in ordinary cases, on old ground, it would be only 10 or 12-fold. The locust was everywhere ravaging this part of the country, and the plain—which as far as the eye could reach was one unbroken carpet of verdure—would, it was to be feared, soon wear an aspect of desolation. The people said the locust had been the pest of the country for ages, and though occasionally disappearing, the young ones after a while are again found swarming in certain parts of the plain.

There appear to be only five or six villages in this small district, which on the s. is bounded by Deshti, and on the N.W. by Kúh Marreh. It was formerly a well-inhabited tract, and furnished a considerable military contingent, but from various causes—principally from the ravages of the locust—it has declined since the reign of Kerrim Khan, Zened.

8th April.—I observed here some ploughs which, as well as I could recollect, were precisely of the form of those occasionally seen on antiques and old coins in this country, and are entirely of wood.

We quitted Ferashbund* in rain which soon fell so heavily that

* *Distances and bearings.*

$\frac{3}{4}$ mile 325°	$\frac{1}{4}$ mile . . . 310 to a second warm spring.
$\frac{1}{6}$ " 350	$\frac{1}{4}$ mile 335°
$\frac{3}{4}$ " 325	$\frac{1}{4}$ " N.*
$\frac{3}{4}$ " 315 to village Aviz.	$\frac{1}{4}$ " 340 to village Gúmbed.
$\frac{1}{6}$ " N.	
$\frac{1}{2}$ " 330 to warm spring.	
$\frac{1}{4}$ " 330	4 $\frac{1}{4}$ Carried forward.

the road was presently flooded, but the storm soon passed over. Ruins of villages extended for a long way close by at the foot of the hills to our right, and frequently old burying-grounds, with long narrow tombstones having Arabic epitaphs. Two and three-eighths miles brought us to the village Aviz, which consists of mud houses and keppehs, or long cylindrical-looking huts, built of branches, matting, and reeds. Proceeding onwards, we presently passed two warm springs, one of which was sulphurous, and the 5th mile brought us to the village Gúmbed, consisting of huts as above described. The road, which had hitherto skirted the hills to our right, now led us away from them, the cultivation on this plain giving way to grazing land sprinkled with kúnar bushes. About the 10th mile occurred a small stream, and half a mile further, we passed the eastern extremity of a line of low hills which cross the plain in a direction E. and W. At $11\frac{1}{2}$ miles we passed through low hills extending from the eastward, and entered another plain belonging to the district Kúh Marreh, and extending E. and W. The village Khaniek, with its vast and probably artificial mound, bore, at the 13th mile, 50° about 1 mile distant. The 18th mile brought us to the village Nújain, which has also a large mound, and palm-trees, under which we breakfasted.

$4\frac{1}{4}$ miles brought forward.	$\frac{1}{4}$ mile 320°
$\frac{1}{8}$ " 345	$\frac{1}{8}$ " N. to Nújain.
$\frac{1}{8}$ " 315 leading away from hills.	$\frac{1}{4}$ " 60
1 mile 320°	$\frac{1}{2}$ " 20
$\frac{1}{2}$ " 330	$\frac{1}{8}$ " N.
$\frac{2}{3}$ " 340	$\frac{3}{8}$ " 40
$\frac{1}{6}$ " 355	$\frac{3}{4}$ " N.
$\frac{1}{8}$ " 335	$\frac{1}{5}$ " N. by ascent over hills in corner of plain.
$\frac{1}{2}$ " 350	$\frac{1}{5}$ mile N.W. descend through valley.
$1\frac{1}{2}$ " 10 to small stream.	$\frac{1}{4}$ mile 335°
$\frac{1}{2}$ " 10 passeastern extremity of low hills, which cross the plain E. and W.	$\frac{1}{4}$ " 330
$\frac{1}{2}$ mile 10°	$\frac{2}{3}$ " N.W.
$\frac{2}{3}$ " 340 presently by slight descent, and then through low hills extending from eastward, and enter another plain belonging to district of Kúh Marreh.	$\frac{3}{4}$ " 315 enter the plain of Jirreh.
$\frac{1}{2}$ mile 345°	$\frac{1}{3}$ mile 335°
$\frac{1}{4}$ " N.	$\frac{1}{8}$ " 320 more hills on right.
$\frac{1}{4}$ " 20 from hence the village Khaniek bore 50° , 1 mile distant.	$\frac{1}{6}$ " N.
1 mile 345°	$\frac{1}{4}$ " 330
1 " 330	$\frac{1}{4}$ " 325
$1\frac{1}{2}$ " 325	$\frac{1}{4}$ " N.
$\frac{3}{4}$ " 315	$\frac{2}{3}$ " 350
$\frac{1}{2}$ " 345	$\frac{1}{4}$ " 340
	$\frac{1}{4}$ " N.
	$\frac{1}{3}$ " N.E. to Ishforkan.
	—
	$24\frac{1}{4}$ miles.

Near the low hills we had just before passed through I was told there are three villages, named Hassanabad, Veissabad, and Kanat-e-Bagh.

The plain we were traversing abounds with turf, and is little cultivated; its surface is sprinkled with the thorny kúnar bush. It extends S.E. to N.W., and is about $2\frac{1}{2}$ miles wide, and is well watered by small brooks. Descending through a valley for a couple of miles, we entered the plain of Jirreh, where the land is cultivated between the kúnar bushes, which also abound here. The road led near hills on our right, and brought us, at the end of the 25th mile, to the village Ishforkan, situated on the right bank of a small stream flowing N.W., amid groves and gardens of palms, pomegranates, and trees of the orange species, in which the nightingales were keeping up a loud chorus. The distance is reckoned at 7 fursacks. This is a very warm part of the country, snow is unknown in the plain; the thermometer stood at 77° at 6 P.M.

I was told that the district of Jirreh extends N. and S. about 7 fursacks, and E. and W. about four.

9th April.—From Ishforkan* we proceeded about a mile to the

* Distances and bearings.

$\frac{1}{2}$ mile 45°	$\frac{1}{4}$ mile N.
$\frac{1}{12}$ " N.W.	$\frac{1}{8}$ " 310°
$\frac{1}{6}$ " W.	$\frac{1}{4}$ " N.
$\frac{1}{4}$ " 315 to Hassanabad.	$\frac{1}{2}$ " 325 to Robat.
$\frac{1}{3}$ " 295 skirting hills.	$\frac{1}{4}$ " N.W.
$\frac{2}{3}$ " 300	$\frac{1}{2}$ " 290
$\frac{1}{4}$ " 315	$\frac{1}{2}$ " 300
$\frac{1}{2}$ " 305	$\frac{1}{2}$ " 280
$\frac{1}{2}$ " 315 to broad bed of Rúd-khaneh Shirin flowing from Kúh Marrah.	$\frac{2}{3}$ " 310
$\frac{1}{2}$ mile 270°	2 " 315 to 330
$\frac{1}{1}$ " 260 to Balla Deh.	1 " 315
$\frac{1}{3}$ " 320	$1\frac{1}{2}$ " 300
$\frac{2}{3}$ " 295	$\frac{1}{6}$ " 325
$\frac{1}{2}$ " 315	$\frac{1}{6}$ " 300
$\frac{1}{6}$ " 300	$\frac{2}{3}$ " 315
$\frac{1}{4}$ " 280	$\frac{1}{4}$ " 300
$\frac{1}{8}$ " 320	$\frac{1}{6}$ " 320
$\frac{1}{4}$ " 310	$\frac{1}{4}$ " 310
$\frac{1}{4}$ " 320	$1\frac{1}{4}$ " 335 over hills.
$\frac{1}{6}$ " N.W.	$\frac{1}{4}$ " N.E. still ascending.
$\frac{1}{3}$ " 320	$\frac{1}{2}$ " N. came in sight of Lake of Favour.
$\frac{1}{4}$ " 295	$\frac{1}{2}$ mile 320° by descent.
1 " 315	$1\frac{1}{2}$ " 305
1 " 320	$\frac{1}{4}$ " 310
$\frac{1}{4}$ " 315	$\frac{1}{5}$ " 330 to the lake.
5 " 325	28 $\frac{1}{2}$ Carried forward.

village of Hassanabad, skirting the hills. When at the third mile to the broad bed of a shallow stream, known as Rúd Khaneh Shirin, presently our path was lost in rice-grounds, which obliged us to make a short *détour* to the ruined village Ballah Deh, outside which the inhabitants were living under keppehs. A low line of hills separates the plain into two longitudinally towards its north-western extremity, leaving on one side a vale of some width. The 15th mile led to the village Robat, a collection of huts and hovels, near which are two neatly-built stone forts, occupied by the families of Shah Hussein and Shah Kúchek, two Seyeds, chiefs of the village, who, I was told, claim and obtain exemption from taxation in consideration of their descent.

Continuing up the vale, we ascended, at the 24th mile, over hills for 2 miles, when we came in sight of the Lake of Famour, a long narrow sheet of fresh water, stretching N.W. and S.E.; its south-eastern extremity was not visible on account of intervening rocks, but it extends to 90° from this point, and there is situated the village Famour. The furthest part of it visible from this spot on its south-eastern extremity was about $2\frac{1}{2}$ miles distant, on a bearing of 55° . I should suppose it to be from half a mile to a mile in breadth; on its southern side it is very shallow, but is said to be beyond a man's depth towards the centre; the land on its southern side was entirely laid out in corn-fields. The lake occupies the northern side of a beautiful vale, bounded by lofty and rocky mountains on both hands, and is fed in its south-eastern extremity. We made a trifling descent, and thence to the margin of the water, then for a mile and a half parallel with it, on a bearing of 310° ; the water then trends to 330° for half a mile, when it terminates in marsh extending about half a mile to the N.W. At $33\frac{1}{2}$ miles we passed the village Kúmúr Keshi, situated a mile to our right, and $2\frac{1}{3}$ miles further brought us to the garden Bugh-e-Nú, where, overtaken by a thunder-storm, we took

28 $\frac{1}{2}$ miles brought forward.	$\frac{1}{12}$ mile .. 320°
$\frac{1}{2}$ " 310 parallel with lake.	$\frac{1}{4}$ " 330
$\frac{1}{2}$ " 330	$\frac{1}{2}$ " 325
$\frac{1}{4}$ " 335	$\frac{1}{4}$ " 340
$\frac{1}{6}$ " 350	$\frac{1}{8}$ " 325 immediately after-
$\frac{1}{3}$ " 330	wards pass ruins of fort Kalah
$\frac{1}{3}$ " 310	Jinan.
$\frac{2}{3}$ " 320	$\frac{1}{8}$ mile 330°
$\frac{1}{8}$ " 310	$\frac{1}{3}$ " 315
$\frac{1}{4}$ " 315	$\frac{1}{4}$ " 335
$\frac{1}{4}$ " 310 pass the village Kú-	$\frac{1}{2}$ " 310 to Kazertún.
múr Keshi 1 mile to our right.	
$\frac{1}{3}$ mile 310°	37 $\frac{1}{2}$ miles.
2 " 315 to Garden Bagh Nú.	

shelter. At the 36th mile we passed the ruins of a fort called Kalah Jinan, touching on the road, and arrived at the town of Kazerún at the end of 37½ miles: the distance is accounted 8 fursacks.

This place is divided into an upper and lower town, and covers a considerable space. The population of the lower quarter had revolted against its governor, Abbass Kúly Khan, and had just killed five of his people and two of the inhabitants of the upper division; this has occasioned a blood-feud between the two quarters. A discharge of small arms was maintained on either side at night during my stay there.

The buildings here are of stone and mortar, and have an appearance of solidity and neatness which is wanting in mud habitations; they are also frequently stuccoed. Many of them are fortifications, possessing parapets and loopholes for musketeers. Barricades had been constructed on the roofs, and the marks of shot showed there had been fighting in some earnest. The inhabitants are a *lootie* set, like those of Shiráz.

The governor told me that Kazerún occupies more space than Jehrúm, but is less populous. He considered Jehrúm the second town in Fars. Perhaps from 1500 to 2000 families may be the population of Kazerún, but, excepting in its size, this place hardly deserves the name of a town, as it is, more properly speaking, a conjunction of two large villages, and possesses only about 100 miserable-looking shops. The situation is the north-western side of a well-cultivated vale, on a slight rise. Palms, walnut, and orange and lemon-trees are nearly the only verdure it possesses. There is nothing of interest to be seen in the place. The climate is warmer than that of Shiráz, but not oppressively so; and the inhabitants boast that it is so fine that fruits of the Ghermsir and Serdsir flourish side by side. Excellent opium is produced in the villages around; the white poppy, from which it is obtained, was in full bloom at the time of my visit. The price of the drug was 8 tomans, or about 72s. for 10½ lbs.

I shall not describe the remainder of my journey to Bushire by the high road, as this is sufficiently well known. At Bushire I embarked in an Arab boat, and, after a somewhat dangerous passage across the head of the Gulf to the mouth of the Shút-ul-Arab, I landed at Mohamrah, and passed a few days in the enjoyment of the society of Colonel Williams, the British Boundary Commissioner, and his large party. Here I was obligingly offered a passage to Baghdad by Captain Jones of the 'Nitocris,' H. E. I. C. war-steamer, and from Baghdad I returned to Teheran by way of Kermanshah and Hamadan, after a journey of nearly nine months.

VII.—*Notes on the Ancient Geography of Mohamrah and the Vicinity.* By Colonel Sir HENRY C. RAWLINSON, K.C.B., F.R.G.S., &c.

[For Map, see vol. xxvi. p. 131.]

Reul, May 11, 1857.

THE ground upon which Mohamrah stands has been formed by alluvial deposit within the historic period, and it is in vain, therefore, to search for the site in very remote antiquity. When Chaldæa was first colonized, or, at any rate, when the seat of empire was first established there, the emporium of trade seems to have been at Ur of the Chaldees, which is now 150 miles from the sea. The ships of Ur, at any rate, are constantly mentioned in the earliest inscriptions in connexion with those of Æthiopia, and there is abundant evidence among the remains of the city, of the worship of the sea-god, which alone would indicate a maritime people, and which, moreover, is in exact accordance with the early traditions preserved by Berosus.

There is, of course, very great difficulty, owing to the shifting nomenclature and the fluctuating topography of the country, in ascertaining the sites of the different cities, which, as we descend from the early Chaldæan to the Assyrian period, appear to have risen into temporary importance on the lower Euphrates. Three cities are especially mentioned under the later Assyrian kings, Beth Yakina, Beth Takkura, and Duran, and two of these, under the names of Aginis and Durine, seem to have existed as late as the time of Alexander. When Sennacherib, in about 700, expels Merodach Baladan from Chaldæa, he captures Beth Yakina, and then offers sacrifices to Neptune on the sea shore; but in the time of Alexander, 370 years later, Aginis appears as an inland village on the Chaldæan lake.

Again, in the expedition of Sennacherib, Billah is described as an island to which the king crosses over from Beth Yakina; but 100 years later it was on the main land; at that time it was re-edified by Nebuchadnezzar and was dedicated to his patron deity Mercury or Nebo, under the name of Teredon or Diridotis, "given to Mercury," a curious proof being thus afforded that at that early period the inhabitants must have been Persians, or at any rate of the Arian race—for it is only in the language of this race that the name of Tir is applied to Nebo or Mercury—and the reason of this nomenclature is not less curious. It is as follows: Nebo among the Babylonians was the god of writing, as Hermes was among the Greeks and Mercury among the Latins. The Babylonian gods are represented generally by symbols, and Nebo is thus symbolized by an arrow, because in the Babylonian alphabet the arrow was the element

used to form letters for writing, whence we call it the arrow-headed character. (All the bricks used in constructing the shrine of Nebo at the *Birs Nimrud*, a temple built by Nebuchadnezzar to that deity, thus bear the same stamp of an arrow.) Now, in Persian the word for an arrow is *Tir*, which thus becomes the proper name for the god.

There is no absolute proof that the famous emporium on the Euphrates, built by Nebuchadnezzar and known in classical geography as *Teredon* or *Diridotis*, is the same as the *Billah* of the Inscriptions and the *Obillah* of the Arabs; but everything tends to that conclusion. The place is often noticed. *Eratosthenes* protracts his measurement of the Euphrates from *Teredon*. *Dionysius*, the geographer, who is thought by many to have been a native of *Charax*, places *Teredon* at the extreme point where the Euphrates flows into the sea. *Arrian* assigns the same position to *Diridotis*; but in *Pliny* certainly, and in *Ptolemy* probably, we begin to find indications that the site was already becoming inland.*

I need only add, in reference to this place, that the Talmudic writers, with *Jonathan* at their head, who translated the Hebrew Bible into Chaldee, confounded *Obillah*, from a supposed similarity of sound, with the *Mosaic Havila*, mentioned in the description of the garden of Eden, and thus rendered *Havila* everywhere by *Hindik*i or *India*, precisely as the early Arabs state that *Obillah* is also called *Hind* or *India*, and as the people of *Busrah* still constantly speak of the districts at the mouth of the river as *Hind*, from the circumstance of their being the nearest points to *India*, and the places where the vessels from *India* rendezvous.†

The comparative geography of the left bank of the Euphrates is

* *Pliny*, however, carries this theory of an accretion of land at the mouth of the Euphrates to an absurd extent. He says that when *Charax* was first founded it was only 10 stadia from the sea, which may very probably have been the case; but when he goes on to say that *King Juba*, under *Augustus*, found the place to be 40 miles up the river, and that the Arab merchants in his own time assigned a measurement of 120 miles to the distance between the mouth of the Euphrates and *Charax*, he is manifestly exaggerating. The average increase of territory I believe to be about a mile in 30 years, which would give an aggregate of 133 miles for the whole period of history, our earliest Chaldean antiquities dating from about 2200 B.C.

† It is owing, I believe, to this confusion between *Havila* and *Obillah* that, on the one hand, the *Phison* was identified with the *Ganges* by some of the old Biblical commentators, and by *Josephus* amongst the number; and that, on the other, the Garden of Eden was placed by speculative critics at the mouth of the Euphrates. I do not myself attach any importance to the last-mentioned explanations, my reminiscences of the pestilential air, the muddy banks, and the dull green vegetation of *Bussorah* and its environs being anything but *Paradisiacal*. It must be confessed, however, that the Arabs, seduced by the tropical vegetation of *Obillah*, to which they were altogether unaccustomed, and lost in admiration at the forest of date-groves which clothed the banks of the canal, classed the *Nahr-Obillah* amongst the only four earthly *Paradises* with which they were acquainted, the other three being the *Sughd-Samarcand*, the *Ghutah-Demeshk*, and the *She'ab-Bowán*.

even more difficult than that on the right bank, the country in this quarter having been subjected to even greater change, owing to the shifting courses of the streams of Susiana, which here approach and mingle with the great river. The most famous city of these parts in antiquity was Spasini Charax, a city of such consequence that a volume has been written on its history by M. St. Martin, without nearly exhausting the subject. It was originally founded by Alexander, and peopled by his invalid Greek soldiers on his return from his Indian expedition. It was rebuilt by one of the Antiochi; then it fell into the hands of an Arab chief, named Spasines, from whom it took its name, and is subsequently known as the capital of a Partho-Greek kingdom, which has furnished a considerable series of coins, with Greek dates and legends, to the museums of modern Europe. If we merely consulted the present hydrography of the country, we should take it for granted that Spasini Charax must have occupied the exact site of the modern Mohamrah, for Pliny places it at the confluence of the Tigris and Eulæus, and such is the received geographical identification; but on a mature consideration of all the evidence, I rather doubt the identity of Charax and Mohamrah, and for these reasons:—The name of Charax continued throughout the Parthian period to the age of Ardeshír Babegán, that king having rebuilt the town in about A. D. 235, and having changed its name from Kerkh-Misán, or Charax of Mesene, to Asterabád. This fact is stated by all the early Mohammedan writers, who drew their information from Pehlvi sources, and may be considered authentic; but Kerkh-Misán, or Asterabád, seems to me to be clearly distinguished in all Arabic geography and history from Ferát-Misán, or Bahman Ardeshír, and that it must be the last-named city which represents Mohamrah is evident from our finding the name of Bamishír, which is a mere contraction of Bahman-Ardeshír, still applying to that branch of the Euphrates which passes by the place. In fact, precisely as the Arabs distinguish between Bahman-Ardeshír, or Ferát-Misán, to the south, and Kerkh-Misán, or Asterabád, to the north, so does Pliny himself distinguish between Forat, which was the great emporium of trade, and Charax, which was the seat of government, placing as he does an interval of 12 miles between them.

I cannot venture at present to point out the exact site of Spasini Charax, because we are too imperfectly acquainted with the interior of the country away from the river to know where the old bed of the Eulæus, which is to be traced in the desert, would fall into the Euphrates; but I should look for the position about 10 miles above the Mohamrah creek, and there I trust researches will be made by some of our enterprising young officers during the present expedition.

I think we may assume that the chronological succession of emporia along the river in the early ages was as follows:—1. Ur of the Chaldees, modern Mugheir; 2. Beth Yakina, or Aginis, about the modern Bussorah; then Dur-An, or Durine, on the left bank of the river, (whose inhabitants Alexander transported to his new city of Charax,) and Teredon or Obillah on the right bank; and lastly, Bahman-Ardeshír, or Ferát-Misán, the latter city continuing for a long period a place of great consequence, well known from Chaldee, Syriac, and Arabic sources, and the seat of a Metropolitan of the Christian church. Ferát, I may add, is constantly stated by the Arabs to be at the passage of the Tigris opposite to Obillah, one being on the right bank of the river and the other on the left; and in the accounts of the Arab conquest it would seem that the army of 'Otba Ibn Ghadhván, after reducing Obillah and driving away the Parsees to India, merely crossed the river to take possession of Ferát; but as the site of the latter place is fixed by the Bamishír river, and Obillah is universally placed at the distance of only 12 miles below Bussorah, it is impossible that the two cities could have been immediately opposite to each other. Ferát, or Baman-Ardishír, in the time of Yacút, (the 13th century,) was uninhabited; but the name still applies to the ruins close to the modern site of Mohamrah.

I must now say a few words on the island between the two arms of the Euphrates at the apex of which Mohamrah is built. This is usually called the island of 'Abadán, from a certain ancient city of that name which was built on it. *Hubadán* may perhaps be read, in connexion with Billah, in the account of the maritime expedition of Sennacherib. The island of Aphana at any rate is named by Ptolemy, and in Marcian we have the island of Appadan, lying off the mouth of the Tigris, which was 80 stadia, or about 10 miles from Spasini Charax, nearly agreeing with the 12 miles of Pliny between Forat and Charax. This island of course gradually increased in size as the deposit of alluvium continued, and is thus often mentioned by the later geographers as Mesene from its position between the two arms. Philostorgius is the first author who describes it in any detail. "Before the Tigris," he says, "disembogues into the sea it is divided into two great streams, and thus discharges itself into the Persian Sea by two mouths situated at a considerable distance from each other, enclosing a large tract of territory between the two arms, and making an island of it surrounded partly by the rivers and partly the sea. This island is inhabited by the race of Mesenians."

Now let us compare with this the following extracts from Yacút:—

"'Abadán is an island at the mouth of the Dijlat el 'Arwa. When the river

approaches the sea, it divides into two branches at the village called Mokharzi. One branch goes off to the right, and is followed by ships bound for the Arabian coast and Bahrein, and those parts; and the other turns to the left, being the channel followed by the ships bound for the Persian coast, that is, for Jennabeh, Siraf, and so on to India. The island is thus shaped like a triangle, enclosed on two sides by the river, and on the other by the sea; and on this island is the town of 'Abadán," &c.

"Miyán rúdán, signifying, in Persian, 'between the rivers,' an island below Bussorah, in which is 'Abadán. The Tigris encloses it on two sides, disemboguing into the sea in two channels, one of which is followed by ships bound for Bahrein and the Arabian continent, and the others by those voyaging to Keis and the Persian shore. The island is triangular, the Tigris forming the two sides, and the ocean the base; it abounds with date-trees, buildings, and villages, among which is Mokharzi, the anchoring-place at present for the sea-going ships."

I have been thus particular in noticing this island, and in showing that its existence was distinctly recognized both by the Greeks and Arabs, because owing to a mistaken conclusion of Macdonald Kinneir's, to which he gave currency in his published map, the geography of the district has been ever since completely disfigured, and very grave political errors have been in consequence committed. The error to which I allude is the identification of the Bamishír as the bed of the Karún and the consequent surrender to Persia of the island of 'Abadán; whereas the Bamishír is in reality the mere Eastern arm of the Delta of the Euphrates, the bed of the Karún lying far beyond it to the East, and Turkey, according to all precedent, having thus an undoubted territorial right to the island lying between the two arms of her own river.

I may here notice that the name of Mokharzi is still applied to some ruins immediately adjoining Mohamrah, and that 'Abadán still retains its name about 15 miles below the bifurcation of the great river. 'Abadán for a long period takes its place in Arabic geography as the port at the mouth of the Euphrates, but later authors in the 14th century, speak of Khashabát, 6 miles below, (where there were poles and floating faggots as buoys to mark the channel of the river,) as the real point of entry into the river. The land now extends 20 miles lower down, Maamer being the last inhabited spot; but there is no place of much commercial importance below Mohamrah.

If I were to attempt to trace in any detail the comparative geography of the country to the eastward of the Bamishír, I should be lost in a sea of conjecture. Both the Kerkha and the Karún have changed their courses several different times. The former river, under the name of the Eulæus, at one time joined the Karún below Ahwáz. At another it joined the Shat-el-Arab, either naturally or by a canal, about 10 miles above Mohamrah, where I place Spasini Charax. It now disembogues in two arms, one, falling into the Upper Tigris at Defás by the channel called

the Had, and the other falling into the Shat below Korna. The Karún, or Pasitigris of antiquity, has in the same way sometimes found its way into the Jerráhi, and thence into the sea; it has at other times filled two or three other beds, intervening between the Jerráhi and the Bamishír, of which three names are well known, the Nahr Sidreh, the Durkestán, and the Gubán, while at present the whole body of the Karún falls into the Bamishír at Mohamrah. It may not be thought, perhaps, of much importance that this hydrography should be traced in detail; still it would not be without its interest, if some of our officers during the present occupation of Mohamrah and encampment on the Karún, would endeavour to trace the old beds of the rivers, and identify the old names of the places along their courses. Arabic history and geography are full of notices on the subject, one or two of which I will add just to show the nature of the materials at our disposal. In a geographical work of the 3rd century of the Hejirah, and which is probably Ibn Khurdádhbeh, the Postmaster's own compilation, we have a very interesting account of all the canals derived from the Euphrates.

"Below Bussorah, the first great canal to the east was one called the Nahr-el-Riyán, and it is said of it—'this was formerly the high road of navigation to Ahwáz, but it is now dried up.'"

Another smaller canal is noticed, and we then have the following passage:—

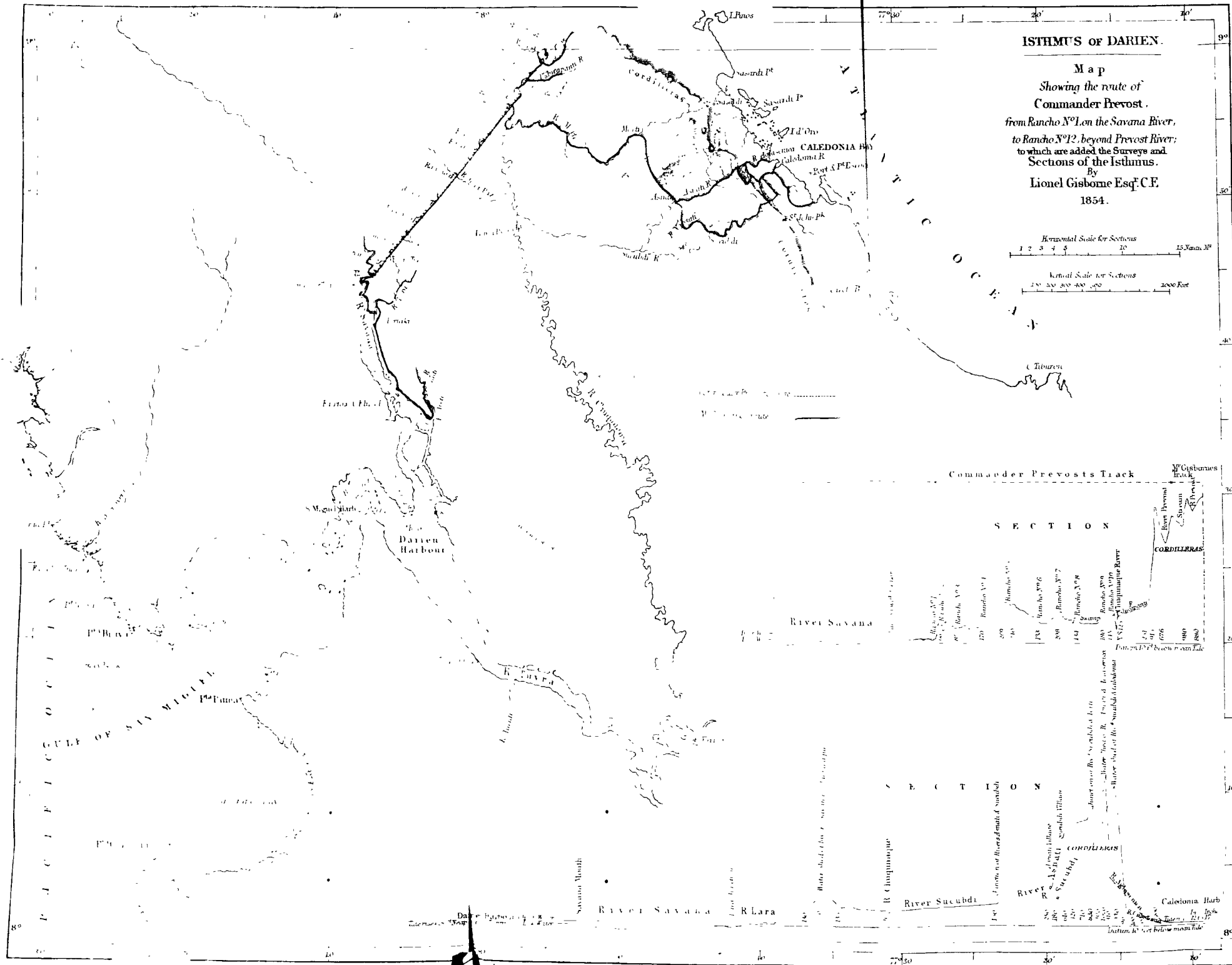
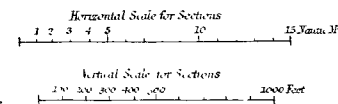
"The fourth canal is the Nahr Báyyán, along which is now the road to Ahwáz. It flows from its mouth to Hasn Mehdi, then to the Fum Delistán, where there is a sea, then to Súk-el-Bahar, then it flows into the Nahr Sidreh, and in that bed joins the sea; and from Súk-el-Bahar to the Masrukán is the Nahr-el-Ahwáz, which passes for a space through a desert country, and then reaches the country of Ahwáz."

One other passage I must quote from Yacút, in reference to the Durkistán channel; he says,

"Durkistan is a small town which I have often seen; here the ships anchor on their arrival from India, it is close to the sea, on the road to Askar Mukrum; there is no other way for ships arriving from Kéis but by it. The ships in their outward passage from Bussorah to Kéis take another course and pass by 'Abadín, but on their return they never come by that channel on account of reasons which it would be tedious to detail, but make for Khuzistán, the lakes of which come down close to the sea, and go on having the sea on their left hand."

ISTHMUS OF DARIEN.

Map
Showing the route of
Commander Prevost.
from Rancho No 1 on the Savana River,
to Rancho No 12, beyond Prevost River;
to which are added the Surveys and
Sections of the Isthmus.
By
Lionel Gisborne Esq^r C.F.
1854.



VIII.—*Summary of the Report on the Survey of the Isthmus of Darien.* By LIONEL GISBORNE, Esq., F.R.G.S., &c.

Read June 9, 1857.

[THE Isthmus of Darien was visited in 1851 by Messrs. Gisborne and Forde, who made some short incursions into the country from both coasts; but having been taken prisoners by the native Indians, and escaping from them with difficulty, they were unable to make a complete examination of the country. Sufficient information was, however, elicited, more particularly as regards the advantage of a good harbour on each coast, to warrant an application to the governments of England, France, and America, to form a joint expedition, with the view of making a survey of the interior of the Isthmus of Darien, between the Gulf of St. Miguel on the Pacific, and Caledonia Harbour on the Atlantic. These arrangements were made, and Carthagena was selected, in the first instance, as a place of rendezvous for the Atlantic portion of the expedition; but it was subsequently found advisable to meet at Jamaica.]

THE only native opposition to be feared was on the Atlantic coast, and it was probable that some delay would occur before arrangements could be made to cross the Isthmus from that side. I therefore instructed Mr. Forde to proceed with the whole of the engineering staff to the Gulf of St. Miguel, viâ Navy Bay and Panama, and to commence the surveys of Darien Harbour and Savannah River. Mr. Forde was also desired to call upon the Commanders of the U.S. corvette *Cyane*, and H.B.M. surveying schooner *Scorpion*, ordered to Carthagena to meet the expedition, and request them to arrive at Caledonia Bay simultaneously with the *Espiegle* and *Chimère*, the English and French ships of war whose rendezvous was Jamaica.

Such an arrangement was important to the success of the expedition to secure combined and simultaneous action with the Indians, who, I felt assured, would be awed by a show of force, and gradually weaned from their exclusive policy by being treated in a conciliatory spirit. Independent action on the part of any of the naval commanders was sure to frustrate the object and increase the difficulties.

Commander Hollins of the *Cyane*, however, sailed and landed a party under the command of Lieutenant Strain, with orders to cross to the Pacific, five days before the arrival of any other man-of-war. Master Parsons, commanding the *Scorpion*, remained at Carthagena until the date fixed for the rendezvous at Caledonia Bay.

On the 23rd of January the following men-of-war were in Caledonia Bay :—

H.B.M. brig *Espiegle*, Commander Hancock.

H.B.M. schooner *Scorpion*, Master-Commanding Parsons.

H.I.M. steam-ship *Chimère*, Lieutenant-Commanding Jauréguiberry.

U.S. corvette *Cyane*, Commander Hollins.

The officers specially deputed by their respective Governments to satisfy themselves, by a personal examination of the interior, of the correctness of the surveys undertaken by the Company's engineer, were—Colonel Codazzi, head of topographical department of New Granada; Lieutenant Jauréguiberry of H.I.M. Navy (French); Lieutenant Strain, of U.S. Navy (American); Lieutenant St. John, R.E. (English).

Previous to my arrival in Caledonia Bay on board of the *Espiegle*, Commander Hollins had entered into an arrangement with some of the Indian chiefs that no party from his vessel was to be molested during their investigations in the interior as long as they respected life and property; but the Indians gave him to understand that they would in no way assist the operations of such parties.

The commanders of the *Espiegle* and *Chimère* made similar terms with those Indian Chiefs, and on the 24th of January the following party were landed, carrying 10 days provisions:—

Lieutenant Preston, Mr. Edwards, Assistant-Surgeon Edwards, and 14 men (armed) from *Espiegle*; Lieutenant Jauréguiberry, Lieutenant Oron, and 14 men (armed) from *Chimère*; Colonel Codazzi and 4 men; Lieutenant St. John, R.E.; Dr. Cullen; Mr. Lionel Gisborne and 9 men; forming altogether a party of 50 persons, of whom 36 were armed.

Commander Hancock and Lieutenant Jauréguiberry sent the armed men to afford protection, fearing that the refusal of the Indians to assist in any manner the objects of the surveying expedition might place the exploring party in danger.

The river Caledonia was ascended for two days; on the morning of the third day an American party, under the orders of Lieutenant Fauntleroy, overtook us, and Lieutenant St. John proceeded with them, thinking that they would cross to the Pacific before us. On the third day it was found that the Caledonia river did not pass through a break in the main ridge of the Cordilleras, but that they, on the contrary, formed a continuous high range. My original anticipations on this point were thus disproved.

It then became my duty to explore this main ridge of the Cordilleras, to search for a break through them. With this object the valleys of the Caledonia and Aglasenica rivers, and their tributaries, were carefully examined, and several attempts made to cross the Cordilleras, but the extreme difficulty of moving about a large body of men among steep hills thickly covered with wood and intersected by deep ravines, made it

evident that the Isthmus could not be thus crossed without great risk and danger or suffering from want of provisions. After eleven days' exploring, the whole party (increased to 120 by the addition of 70 New Granadian soldiers and convicts) returned to the ships. The Americans, under the command of Lieutenant Fauntleroy, and accompanied by Lieutenant St. John, returned three days after leaving us on the Caledonian river, without having succeeded in crossing the Cordilleras. Nothing had been heard of Lieutenant Strain, and several parties sent in search of him returned without any tidings.

We heard at this time that Captain Prevost,* of H.M. steam-sloop *Virago*, had, by orders of his Admiral, formed an expedition to cross the Isthmus from Darien Harbour to Port Escoses; that in complying with these orders, four of the party had been killed by the Indians early in January; and that the rest had only escaped by a forced march towards their ship, being closely followed by two hundred armed Indians.

Robinson, the second chief of the whole tribe of the San Blas Indians, told us of this casualty; he explained that no treaty had been made with those persons, and the Indians, unaware of any friendly incursion into their territory, took them for Spaniards, and killed them in accordance with the law they had enforced for beyond a century: he assured us that no such act would be perpetrated against any one coming from the vessels in the harbour, because a treaty had been made guaranteeing their safety from molestation.

It appeared to be the impression among the Indians who occasionally came on board, that Lieutenant Strain and his party had lost their way, and were starving to death; 18 days had elapsed since they landed, and they had started with only 10 days' provisions.

Experience had proved that moving a body of men sufficient to act as a protecting force and to carry the necessary provisions was attended with great risk and great delay; I therefore determined to use every means to obtain native guides, and cross, if necessary, alone with them. Had all the commanders of the men-of-war acted in concert at the outset, I have no doubt that native guides could have been procured and a better treaty made with the Indians; the independent action of the American commander created difficulties at every step. The Indians, although offering no direct hostility, abandoned their villages at our approach, and during the whole time of our absence in the interior I believe that only two Indians were met with, and they had evidently been surprised in a banana plantation without being aware of our approach.

* See *Journal of the Royal Geograph. Soc.*, vol. xxiv. §.

All these Indians have fire-arms, which have wholly superseded the bow and arrow as an arm for warfare.

After many conferences, it was at last arranged that Robinson, the Indian chief, was to provide guides and accompany Lieutenant St. John and myself, with two men, as far as the head-quarters of Mr. Forde, at the confluence of the Savana and Lara, as fixed in my instructions to him. Commander Hancock and Lieutenant Jauréguiberry acquiesced in this arrangement, and we started on the morning of the 7th of February, carrying five days' provisions.

We ascended the Caledonia river, and crossed the ridge of the Cordilleras between it and the Sucubdi at an elevation of 930 feet above the sea. We descended the Sucubdi river as far as the village of that name, and in consequence of the difficulties of getting canoes, and hearing that eleven days before Lieutenant Strain's party had been seen proceeding towards Asnati, we directed our course n.w., and crossed the valleys of the Asnati and Morti rivers.

At the latter village, the chief, who acted in a most friendly spirit, provided canoes which conveyed us to the Chuquanaque river, and up to the point where "Prevost's track" strikes it. We walked along this track to the Savana, having been five days in crossing. About three miles from the Chuquanaque, we found three of the bodies of the men from the Virago, who had been murdered by the Indians. Their clothes and provisions were untouched, their bones, still forming connected skeletons, clean picked by vultures, presented in their half-clothed state a hideous appearance; the fourth man, it is supposed, was wounded, and, having taken to the bush, was despatched at some distance from his comrades.

On our reaching the Savana, we found provisions and memorandum left by Mr. Forde's party, and descended in the canoes to the confluence of the Savana and Lara, the head-quarters of the Pacific portion of the expedition.

I had expected to find the surveys on this side in an advanced state, but, on the contrary, Mr. Forde was at Panama laid up with rheumatic fever, and the fatal termination to Captain Prevost's expedition had caused such a panic in the villages of Chapigana and Yavisa, that neither men nor canoes could be got on any terms, and the engineers, abandoned even by the sailors of the small cutter which had been chartered at Panama, were unable to forward the surveys.

Lieutenant St. John and I having crossed with safety, and the fact of Robinson being with us, inspired confidence; and by paying exorbitant wages a few men and canoes were procured, and the surveys put in hand.

From the accounts I heard of the low ground found by Captain

Prevost, as far as the Cordilleras, from whence some of his party stated they saw the Atlantic Ocean, I was anxious to verify these statements, although already aware that Captain Prevost, misled by the incorrect published charts of both coasts, had followed a N.N.E. course which strikes the Atlantic much to the north of Caledonia Harbour.

The Sucubdi pass is south of a good direction between Caledonia Harbour and Darien Harbour; "Prevost's track" is north of it; the Pacific flank of the Cordilleras, between these two points, had been sufficiently examined to give a correct idea of the general topographical features of the country. A considerable portion of the Atlantic flank had also been explored. I hoped, by recrossing "Prevost's track," to collect sufficient general information to decide upon the direction, if any detailed surveys and sections should be undertaken from the Atlantic side.

Mr. Armstrong and I left the Savana River, and started with Robinson and two men, on the 17th February; we reached the end of "Prevost's track" in three days, and went a day's journey further in a north-easterly direction without being able to reach the top of the main range of the Cordilleras, or any point from which the Atlantic ocean can be seen; we found that a N.E. course would come out on the Atlantic about Putrigandi, where the Spanish charts denote the presence of swamps, and among Indians, who not being aware of our approach might use violence and frustrate our object. We could not have reached the vessels without canoes, and if they had been refused we must have returned again to the Pacific. One of the party was completely knocked up from fatigue; and Mr. Armstrong and I had to carry nearly the whole of the kit and provisions.

We reluctantly returned to the Savana; I had received a severe scorpion bite which inflamed my arm so as to render it useless; fatigue, and want of sleep from pain, unfitted me to undergo the exposure and hardships of a third expedition to cross. We attempted it however, but failed again from the want of canoes to ascend the Morti river; the Indians from that village having mistaken the day they had promised to return for us, and hearing that we had proceeded along Prevost's route towards the Atlantic, had gone back to their settlement. I then determined to proceed to Panama; the small ten ton cutter anchored at the mouth of the river Lara was the only available boat. Lieutenant St. John had returned to Panama in the schooner which had come down with provisions, three days after Mr. Armstrong and I started to recross by Prevost's track, stating that it was his intention to proceed to England.

After beating about 5 days against contrary winds, we were driven back to the bay of St. Miguel; a large barque had brought

some Granadian soldiers and convicts to assist in the objects of the expedition. I chartered her to return to Panama, and just as we were setting sail, H.M. steam sloop *Virago*, Commander Marshall, steamed into Darien harbour.

Rear-Admiral David Price had sent her, in accordance with the instructions forwarded by the Admiralty to have an English vessel of war stationed in Darien harbour during the progress of surveys.*

Commander Marshall and his officers received us on board with the cordiality of brother explorers, and my sufferings from the effects of the scorpion bite were relieved by medical treatment. I had used every endeavour to induce the Indians at Morti to give me canoes to descend the river Chuquanaque to search for Lieutenant Strain, who I felt certain was lost along its banks. Mr. Bennett had by my instructions arranged to proceed on this service, but when the time came, the Indians from Morti, who returned according to their promise to the Chuquanaque end of Prevost's track, refused to descend the Chuquanaque, stating that the country belonged to New Granada, with whom they were not on friendly terms. The authorities at Chapigana and Yavisa would in no way countenance an expedition to ascend the Chuquanaque, nor could men or canoes be engaged for this service on any terms.

The arrival of the *Virago* renewed my hopes of finding Strain.

Commander Marshall had received instructions to seek redress for the loss of four men of the *Virago* in last January, and to assist and protect the surveys.

These duties were incompatible, and at his desire I wrote a letter urging the abandonment of "seeking redress," and substituting "the search for Lieutenant Strain and his party."

Commander Marshall acceded to my request, and after landing Mr. Armstrong, Mr. Bond, and myself at Panama, a boating expedition was formed with this object, commanded by Lieutenant Forsyth, who volunteered for the service, and accompanied by Mr. Bennett.

They left the *Virago*, in one of the paddle-box boats, on the 17th of March shortly after midnight, and reached the confluence of the Chuquanaque and Tuyra the same day at sunset, and the village of Yavisa about 10 p.m. With considerable difficulty, 6 canoes and 11 natives were hired; about 17 miles above Yavisa, the ship's boat had to be left in charge of the gunner and 6 men, shoal water preventing its going any higher up.

On the 23rd March, the dead body of Señor Polanco was found

* Captain Prevost's expedition was formed previous to the receipt of these instructions, and in ignorance of any expedition leaving England.

lying on the grave of Señor Castello; they had been sent out by the Granadian Government to assist in the objects of the surveying expedition, and had volunteered to accompany Lieutenant Strain's party. A good deal of time was lost in dragging the canoes over shoals and avoiding trees. On the evening of the 23rd March, the missing party was found in a most deplorable state of destitution. Notwithstanding Dr. Ross's (of the *Virago*) assiduous care, one of them died before they returned to the vessel (29th March), making the sixth victim to starvation. For 50 days had these unfortunate men subsisted wholly upon small palm nuts, which had worn all the enamel off their teeth. Considering the nature of the country and the awful privations they suffered, too much credit cannot be given to Lieutenant Strain for the extraordinary energy, endurance, and perseverance he has displayed. It is much to be regretted, that the splendid qualities he has shown as an explorer were not made available to collect information important to scientific and commercial interests.

Mr. Bennett has made a track chart both in ascending and descending the Chuquaque. It agrees most remarkably with a map given to me by Colonel Codazzi, out of the archives of Bogota, made in 1787, by a Spanish officer, who ascended it as far as the *Isola de la Paz* at the mouth of the *Sucubdi*. The Spaniards had at one time an encampment of 400 soldiers on this island, which communicated by a road (a foot-path) with *Fuerte del Principe* on the *Savana*; they were however obliged to abandon this post in consequence of the opposition of the Indians and the overflowings of the river in the wet season.

They made several attempts to cross from *Isola de la Paz* to *Fort Carolina* in *Caledonia Harbour*, but were driven back by the Indians. Lieutenant Milla (a Spaniard) crossed from *Fort Carolina* to *Fuerte del Principe* in 1787, accompanied by an Indian chief named *Ruchuchie*; the Buccaneers in 1680 went from *Caledonia Harbour* to the *Chuquaque* and descended it to *Darien Harbour*, destroying the town of "*Santa Maria*," where the Spaniards were supposed to have a *depôt* of gold. I believe these to be the only authentic accounts of the *Isthmus of Darien* having been crossed.

In approaching the Pacific coast from the seaward, a succession of three anchorages is offered to the mariner. 1st, The Bay of *St. Miguel*; which may be classed as an open roadstead, better sheltered, and with better anchorage than either *Navy Bay* or the bay of *Panama*; 2ndly, *St. Miguel harbour*, well sheltered by a row of islands of considerable extent, accessible at all times and with good holding ground; 3rdly, *Darien harbour*, a land-locked estuary approachable by two deep entrances, perfectly sheltered, of great extent, and with deep water close in shore.

On the Atlantic there is only a tide of from 11 to 17 inches; on the Pacific spring tides rise 24 feet, neap tides 18 feet. With such a difference in the tides of the two oceans it is impossible, without long-continued and careful observations, connected by a perfect set of levels, to state with accuracy what is the *exact* comparative mean level of the two oceans; but the levels and observations made by Colonel Totten, the engineer to the Panama Railway Company, and those made by Colonel Childs at Nicaragua, render it, I consider, no more doubtful that the mean level of the two oceans, where the tides are unaffected by local circumstances, such as an indented line of coast, the presence of shoals, &c., may be said to be practically the same. The position of the rivers Savana and Lara have been fixed by a triangulated survey, which nearly agrees with the course originally laid down in the maps appended to my former Report. The character of the country between the Savana and the Chuquanaque is similar to that described in that Report. Two flat plains are separated by a low range of hills. Mr. Forde and I penetrated in the year 1852 across the water-shed of the Savana, and, finding traces of Indians, returned again for fear of being taken prisoners a second time. The loss of Commander Prevost's men within a few miles of this place, and the fact that 200 armed Indians having followed him and burnt the ranchoes (sheds built as night quarters) as far as the water-shed of the Savana, proves that our fears were well founded and our retreat judicious. I have no doubt that had we persevered in exploring the river which we supposed to be the Caledonia we should have known our error, but never returned to communicate the fact.

The Chuquanaque has its source considerably to the north of where Spanish maps had placed it: the general impression has been that it is a precipitous river with numerous rocky falls, whereas it is only 115 feet above mid-tide at the point where Prevost's track strikes it, being an average fall of 11 inches per mile throughout its whole course. It receives a number of tributaries, nearly all flowing from the Cordilleras, the water-shed between it and the Savana being narrow and devoid of rivers.

The surveys on the Pacific side were now in a forward state, but the best portion of the season had been lost, and but little advance made in the surveys on the Atlantic side, where the chief difficulties exist.

I returned to Caledonia Harbour on the 22nd March: nothing had been heard of me for nearly six weeks, and I believe that every one, except Captain Hancock, had given me up as lost. Lieutenant St. John had returned to England; Colonel Codazzi and his troops and convicts had returned to Carthagena; the Chimere was at Carthagena to meet the French admiral; the

Scorpion had completed the survey of Caledonia Harbour; the *Espiegle* was at anchor, and her commander and officers welcomed us on board in the spirit which secures friendship.

Arrangements were immediately made to go again into the interior with all the available staff (Messrs. Armstrong, Devenish, and Bond), and a survey and section was put in hand along the valleys of the Aglasenica and Asnati rivers. The outline of the Cordillera ridge, as seen from the top of Oro Island,* appears to dip about the head of the Aglasenica; but the broken character of the country, thickly covered with wood, makes it difficult to distinguish the main ridge from the subsidiary. The lowest point between the sources of the Aglasenica and Asnati rivers is 1013 feet; the Atlantic flank is very precipitous, but the fall towards the Chuquanaque more gradual.

We walked along the Cordilleras' top for several miles s. of the Aglasenica Pass, and I feel assured that no gorge exists between that pass and that at Sucubdi.

I made arrangements to cross again to the Chuquanaque from the village of Sassardi, along the valley of the river Morti. Lieutenant Preston (1st of the *Espiegle*) again gallantly volunteered to accompany me; we were to go alone, with two Indian guides promised to us by Denis, one of the chiefs of Sassardi, and the principal trader along the coast; but on arriving at Sassardi we found that the first chief of the settlement had collected forty or fifty of his men to oppose our entry. An angry discussion arose, during which the Indians showed such hostility that it was evident that force alone could obtain a passage to Morti. Hitherto our relations with these Indians had been friendly, and they had acted with good faith; I felt sure that Strain and his party had not been attacked by them, although they may have suffered from their want of co-operation; to enter into hostilities now was to assure the death of the whole of this missing party, and risk more lives for an object which offered no particular inducements.

The Indians say that the Sassardi Pass is higher than the Sucubdi one, and that the upper portion of the Morti River is more rocky and difficult to walk than that of the Sucubdi. I have no reason to believe that such is not the case: the Cordilleras n. of Sassardi, where I had been, in continuing out Prevost's track towards the Atlantic, are certainly a high unbroken range; the valleys of the Sucubdi and Asnati are elevated and not very precipitous for the first four or five miles from their source. The Morti River is not navigable for canoes beyond the village of that name, and the Cordilleras opposite Sassardi appear from the

* A clearing was here made to obtain a view.

seaward an unbroken range, with a number of spurs descending down to the coast.

The rainy season was commencing, and the rivers were sensibly affected by the showers, which began to fall with regularity two hours before daylight. When the rivers are swollen it is impossible to walk in the interior, so that supposing the Sassardi Pass to be the lowest, which I have every reason to believe it is not, no surveys could be undertaken this season in that direction without great risk to the surveyors.

For these reasons we reluctantly abandoned the examination of this portion of the isthmus.

On the completion of the surveys and sections along the valleys of the Aglasenica and Asnati rivers, we returned to Carthagena on the 9th of April, and bade farewell to our friends on board the *Espiegle*, *Chimère*, and *Scorpion*, through whose assistance and co-operation we had succeeded in examining without a single casualty a country where hitherto all explorers had failed from the determined opposition of the natives, and which had more than once resulted in a sacrifice of life.

Robinson and Denis (two Indian chiefs) told me that on Mr. Forde and I being taken prisoners in 1852 our death was determined on, and it was only the accidental absence of the chief of Caledonia on a fishing excursion that caused a delay, and gave time to our friend "Bill," the Indian who on that occasion took our part, to persuade them to expel us from the coast.

A set of meteorological observations have been registered on each coast almost hourly during the whole time of my stay. They present some very interesting information relative to the regularity of the atmospheric tide. The hourly barometric observations, taken with standard instruments previously compared with the standard at Greenwich Observatory, have enabled me to fix a number of heights in the interior by means of the mountain barometer with almost the same exactness that a set of simultaneous observations give. A great many of these barometric heights have been checked by actual levels, and generally proved correct within 10 feet. From my experience of the use of the mountain barometer on the Spanish Main, I believe that a barometric section carefully made with good instruments can be depended upon within 10 feet.

The extreme difficulty of levelling in a country covered with a dense forest and intersected by deep ravines and precipitous spurs makes the use of the mountain barometer most valuable for determining the general elevations. It will be seen by reference to the thermometric and hygrometric registries that the temperature of the air does not vary much from night to day, and that at no time

was the heat very great; the constant breeze prevents that sultry feeling experienced in many other places in the tropics.

The absence of swamps, the cool breezes, and the equable temperature are the principal causes which make both coasts of this isthmus as well as that of the interior so healthy. The report from the medical officer attached to the expedition speaks most highly of the salubrity of the isthmus.

There have been altogether in this surveying expedition 900 persons subjected to climatic influences, some along the coast, some in the interior; and I believe that I am correct in stating that not a single case of illness occurred during the whole period of our stay, and the only casualties were a scorpion bite I received, and an accident to a marine from the *Espiegle*, who was confined to his hammock for a few days from falling upon the stump of a tree.

Considering the exposure and hardships the men were subjected to in the interior, but which only seemed to stimulate the spirit of volunteering, it is surprising that no fevers or festering wounds resulted.

Commander Prevost's experience on the Pacific side * has been very favourable to the salubrity of the isthmus, and he records the same remarkable absence of all ailments among men exposed to similar hardships and living upon a short allowance of salt provisions.

Hitherto the only reliable published charts of both coasts of Darien were those made by the Spaniards nearly a century since. These charts are incorrect. Captain Prevost, in laying down the shortest route from the Savana to Port Escoces, adopted a N.N.E. course; whereas the true bearing of Port Escoces from the point of the Savana, where he left it, is E. 17° N.; a N.N.E. course strikes the Atlantic coast 20 miles N. of Escoces. Captain Prevost, in his Report, states how completely the incorrect published charts and maps misled him.

The reason of this discrepancy is that the coast line at St. Miguel Bay is placed 8 miles wrong in longitude, and nearly 3 miles wrong in latitude. Caledonia Harbour is 8 miles wrong in longitude. When it is considered that the total distance across from the point the tide reaches in the Lara to the Atlantic coast is, according to these charts, only 21 miles, it is evident that any conclusions drawn from them as to the relative positions of points in the interior must be wholly fallacious. Of the interior itself, the most authentic map which I have had access to is that furnished by Dr. Cullen to Sir Charles Fox. My former imperfect examination of a portion of the isthmus proved this map to be untrust-

* See vol. xxiv. of the *Journal of the Royal Geograph. Soc.*, p. 249.

worthy ; the more correct and detailed examination now made has proved that the published charts are likewise untrustworthy. Lieutenant Strain, possessing only similar incorrect information, supposed himself to be on the Savana when he was at the head of the Sucubdi, and on reaching the Chuquanaque hourly expected to see the Pacific tide ; the distance he had walked, supposing even it was not over-estimated, an error which can hardly be avoided, should, by the information derived from the charts, have made his position on the Chuquanaque very near to Darien Harbour. The Savana and Chuquanaque both run nearly N. and S. ; the Chuquanaque was not known to extend so far N. ; Lieutenant Strain, therefore, took it most naturally for the Savana, and followed it down.

The incorrectness of the position of Caledonia Harbour was determined a very few days after our arrival on the coast. Two days exploring up the Caledonia River showed that no gorge exists through the main ridge of the Cordilleras in that direction. Thus the main facts upon which the design for an uninterrupted ship-navigation was based were disproved at the outset.

The map represents the general topographical features of the country. The harbour of Caledonia has been most carefully surveyed, and in great detail, by Master Parsons, commanding H. M. schooner *Scorpion*. Nothing can be more satisfactory than the result of this survey. Two good entrances into a perfectly sheltered basin with deep water and good anchorage, offer rare advantages when situated in a healthy locality, commanding beautiful scenery and possessing an unlimited amount of excellent fresh water.

Darien Harbour can be best judged of by an examination of the map. It cannot be excelled for shelter, extent, good anchorage and beautiful scenery. The survey of this harbour has been made by Master Inskip of the *Virago*, who most kindly executed this work during the absence of the boating expedition up the Chuquanaque. The coast survey was made by Captain Kellet, R. N.

The Morti, Asnati, and Sucubdi rivers are navigable for canoes up to the villages of the same names ; above these points, they assume the character of mountain torrents, flowing sometimes through rocky gorges, but presenting generally the character of reaches terminated by rapids ; in the dry season, from December to May, they have wide shallow beds, with here and there deep pools, but in the wet seasons they form foaming torrents, occupying the whole valley, and carrying down rocks and trees.

The Cordilleras are an unbroken range, varying from 900 to 1600 feet in height, from which branch off a number of subsidiary ranges, ending abruptly where broken through by river valleys,

and presenting, particularly on the Atlantic flank, the character of narrow gorges with precipitous sides. The Caledonia, Aglasenica, and Sassardi rivers flow into the harbours of Caledonia and Sassardi; the former and latter are navigable for canoes up to the villages named after them situated at the very foot of the Cordilleras which rise abruptly above them.

The whole country to the top of the highest summits is covered with a dense forest, and I cannot perhaps exemplify better the difficulty of cutting one's way through it, than in referring to the slow progress made by Captain Prevost, over a flat country not nearly so thickly covered with underwood as are the flanks of the Cordilleras. Captain Prevost's arrangements for carrying out his object were most admirable, and the energy and perseverance displayed by his whole party are a guarantee that no time was lost in pushing on as far as circumstances would admit of. Notwithstanding this he was 12 days cutting a path 19 miles in length, the party consisting of not less than 20 men. Place the same energy and perseverance, actuated by a similar object, among deep ravines and innumerable spurs with almost precipitous sides, the whole densely wooded, and the progress made would be considerably less; the difficulty of carrying provisions is also greatly increased as well as the chance of losing the way, or determining any position relative to the coast.

At first we used to toil up the top of the highest and steepest spurs, hoping to get a view of the general features of the country; experience soon proved that in nine cases out of ten, the tops of the hills offered no better views than the bottom of the valleys. It must be remembered that these forests do not only consist of a number of tall stems capped with foliage, but that every branch and every stem is interlaced with creepers, that hang in festoons down to the thick underwood which almost everywhere covers the ground. It is a wall of foliage of the tropical type. During the whole time I was on the Isthmus, I did not get half a dozen glimpses at recognisable objects which were more than a few yards distant. The general direction of a valley can sometimes be traced for a considerable way, but the fact of the view being guided by a line of trees offering an uniform sameness, broken by no salient point, deceives the judgment in estimating the distance. It is almost impossible not to over-estimate distance in this country, when judged of either by the eye or from walking.* There is nothing *relative* to fix one's judgment upon when the eye meets everywhere a mass of foliage which is so dense, that whether it is a mile off or five or six miles off, nothing but the whole mass is distinguishable. The peculiar bright or hazy state of the atmosphere

* See vol. xxiv. of the Journal of the Royal Geograph. Soc.

(for although contradictory, only both words can express the halo caused by a brilliant tropical sunshine upon foliage) adds to the deception, particularly when light clouds are floating about the tops of the higher hills, as is generally the case about the Cordilleras.

There is no doubt that, on our former visit to the Isthmus, Mr. Forde and I were greatly deceived both as to the distance walked and as to the distance seen.

We crossed two ranges of hills opposite to Port Escoces, having had no opportunity of obtaining any view of the country such as was afforded in this visit from the top of "Isla del Oro." The river Caledonia, about $2\frac{1}{2}$ miles higher up than where we ascended the mound and got a view to the s.w., turns suddenly to the s., dividing into two branches, giving this place the appearance of a gap in the hills. The quantity of water flowing in the Caledonia, showed that the source could not be less than seven or eight miles distant, and as the only flat country is to the s.w. it was not unreasonable to suppose that the valley continued in that direction. The late investigations have proved both to Captain Prevost and to myself the impossibility, in such a country, to judge of distance, or to found opinions upon partial views without long experience earned by toil and danger. Our first visit was made under peculiar circumstances, attended by great personal risk, and without any previous information, to correct impressions or to lead the judgment. When the error is pointed out, it is easy for others to express surprise and show how it could have been avoided, but the fact should be judged by what was then known, not by what has been since elicited. Under the circumstances we arrived at and left Port Escoces it was not to be expected that latitudes and longitudes could be correctly fixed; we then succeeded in penetrating a certain distance into the interior from both sides of the Isthmus, bringing home some correct and some incorrect information; this time surveys have been successfully made and the country well explored. Until Mr. Forde and I drove in the small end of the wedge, the Indians had kept their country shut out from all inquiry, and had not we been in a position to obtain the assistance and co-operation of influential governments, this country would have still been a blank in the annals of geography, and public opinion remained restless and dissatisfied as to the question of a great Ship Navigation in this locality.

The map and sections * speak for themselves as to the impossibility of carrying out an Inter-oceanic Navigation without locks—which shall at all times pass the largest vessels afloat. The harbours are magnificent, the climate healthy, the country fertile

* See vol. xxiv. of the Journal of the Royal Geograph. Soc.

and covered with valuable timber; in fact, everything exists for anything but a ship-navigation, suited to the commerce of the two hemispheres. The commerce of the world demands a large inter-oceanic navigation, and it is not because the Isthmus of Darien cannot be made available for this purpose, that the question itself is to fail, and that commerce must rest satisfied with inter-oceanic roads and railroads.

The public will not be content until the whole of the country lying between the Rio Atrato in New Granada and the Gulf of Campeche of Mexico, has been searched for the best place to make the communication which is to divide a continent.

Wherever the favoured spot is, two elements must exist: good harbours (or the means of making them), and a short distance. This limits the inquiry to a very few places, and those can be reduced to two or three by a cursory examination.

Two surveying vessels on each coast could in a few months examine the unsurveyed portions of Central America sufficiently to decide where good harbours or facilities for making them exist.

It is not probable, that many such places will be found opposite each other; where such is the case, a general examination of the interior would soon eliminate the impossibles, leaving perhaps two or three places where a more careful and detailed examination may be necessary.

It must be remembered that the Isthmus of Darien is the only portion of this country which has been heretofore wholly unknown, or where the natives oppose the entry of explorers, so that the difficulty of examining any other part of the interior between the Atrato and the Gulf of Campeche would not be so great as that experienced in Darien.

Emigration to California showed the necessity of something better than the old Spanish mule track from Chagres to Panama. The Panama railway when first brought under the notice of capitalists was received coldly, and doubts were thrown upon its commercial advantages. Three American firms had for years the sole management of this work, supplying all the capital. There are now two rival schemes competing for this local traffic, local to the continent of America. At Nicaragua there is already a transit; the one at Tuantepeque threatens to become so.

If the traffic of one state actually supports two routes, and might support half a dozen, surely the commerce of two hemispheres can afford to secure one for itself; or if some hesitate to arrive at such a conclusion without knowing before-hand what this desirable object would cost, they must admit that the object is at least worth the trifling expenditure required to determine where the greatest facilities exist to form a transit route, whether canal, railway, or road.

Nor can the search for this locality be left wholly to private enterprise. Much depends upon the results of coast surveys, which are but a trifling expense to governments having surveying vessels ready equipped, and a great deal also depends upon the spirit, in which the Powers who rule the countries, grant concessions for the use of their territory: besides, a great work which will affect the commerce of almost every maritime nation, must be conducted with the support and under the guidance of the first Maritime Powers, and it is therefore their interest to assist in the settlement of the question.

IX.—*On the Causes of the Mild Winter-Temperature of the British Islands.* By THOMAS HOPKINS, Esq., M.B.M.S., Vice-President of the Manchester Literary and Philosophical Society, &c.

Read June 22.

MANY well-informed persons believe that the temperature of oceanic currents materially affects, and to a considerable extent determines, the climates of countries near to which they flow; and this belief probably rests on the supposed influence of the warm Mexican Gulf-stream on the climate of the north-western portion of Europe. Such an opinion is to be found in the works of eminent men, advanced in a way which shows that the writers believed it to be generally entertained; and, without producing evidence, they assumed it to be well founded. The president of the British Association, in his opening speech at Hull, distinctly said that the comparatively mild winter-temperature of this country was due to the warming influence of the Gulf-stream; and he ventured a speculation as to the probable effect of an opening being made by nature in Central America, which should allow the tropical ocean current that now runs through the Caribbean Sea into the Gulf of Mexico to pass farther west, and enter the Pacific ocean. Should such a change occur, he represented that this country would be very much colder than it is, and that its winters would become as severe as those of the opposite coast of the Atlantic.

Considering the vague notions that have been entertained respecting meteorological influences on climate, it is not very surprising that such an effect should be attributed to the great warm current which undoubtedly flows from the northern tropic into the Atlantic. The temperature of the part of the ocean where the stream enters it is high for the latitude, and is evidently rendered so along a certain belt near the American coast, by the

Gulf-stream. And, apparently, without making any attempt to ascertain what effect such a temperature of the ocean can have on contiguous countries, a conclusion seems to have been generally arrived at that the Gulf-stream must be the cause of the warm winter climate of those islands which are situated so remote from it! The subject has been treated as one resting on simple and well-known facts—those facts being assumed to have the relation of cause and effect. The Gulf-stream, which enters the Atlantic in the winter, is warm, and the British Islands and other parts of north-western Europe have warm winters; and as no other cause was known to account for the warmth of these winters, the Gulf-stream, though thousands of miles distant, was presumed to be the cause. But if, as alleged, a warm sea materially increases the temperature of adjoining countries in a cool latitude, it would always produce that effect, unless counteracting causes interfere; and we should find that, wherever there was a warm sea there would be a warm winter climate in the country contiguous to it: and it would naturally follow that the effect would be great in proportion to the height of temperature of the water. Is this, however, the case, even with the water of the Mexican Gulf itself, or of the stream that flows immediately from it towards the north?

The water that passes through the Caribbean Sea into the Gulf of Mexico comes from near Africa, and is therefore long exposed to a tropical sun, and much heated. It is detained in a large and almost enclosed space, much of which is within the northern tropic, until its temperature is further raised, attaining at last the height of from 86° to 100° of Fahrenheit, which may be considered the highest temperature that is reached by any large body of water in the ocean. But on inquiry being made, we find that this very warm inland sea does not produce a corresponding effect on adjoining countries. Texas, Louisiana and Florida bound this sea on the north, and their winter climates are certainly not warmer than what belong to their latitudes; they, therefore, do not appear to be sensibly affected by the warm sea that is near them. This accumulated body of warm water finds an outlet in a channel between Florida and the island of Cuba, and through this channel the water, retaining its high temperature, rushes with considerable impetuosity.

The stream, passing northward between Florida and the Bahama Islands after the rate of five miles an hour, is said to be 52 miles broad opposite Cape Biscayo; and it passes along the coasts of the United States, being for a considerable distance parallel with them. By the time that it reaches the latitude of $28\frac{1}{2}^{\circ}$ it is of the width of 59 miles, and, spreading as it proceeds, is found to be from 138 to 173 miles in breadth opposite Charleston, in lat.

33°, where the current runs from three to five miles an hour in the narrowest parts, and diminishes to one mile farther north. Now if a warm sea current could, by its contiguity, give considerable warmth to the land near to which it passes, or to the mass of the atmosphere over that land, we ought to have the northern coast of the Gulf of Mexico and the eastern coast of the United States, from the southern point of Florida to Cape Hatteras, rendered decidedly warm in the winter season by the Gulf-stream. The whole of this country, between the eastern coast of America and the Mexican Gulf, is flat and low, being little above the surface of the warm water that adjoins it on two sides, and therefore is as fully exposed to the influence of the water as land can be by its contiguity. But so far from this part of the country having a warm winter climate for its latitude, it is rather remarkable for its low temperature in that season, the growing cotton being often damaged by the frosts. It is said in Lizar's Atlas, that "In Georgia the thermometer sinks to 17°! and still further south, at New Orleans and Louisiana, the winter is occasionally severe. The prevalence of cold, so far south, is partly to be ascribed to the northerly winds, which, bursting forth in tremendous hurricanes, sweep along the vast plains, and carry the dominion of cold far into the southern countries." That is just the case! Atmospheric influences are sufficiently powerful to produce an opposite climate in the parts named, to that which we are told is caused by adjoining warm water.

In the meridian of Halifax the warm current is nearly 276 miles broad. Here it turns to the east, its western margin touching the extremity of the great Bank of Newfoundland. Throughout the whole of this course it is distinguishable by its temperature, which is, however, reduced as the stream flows on, spreading itself out in colder latitudes. From the Bank of Newfoundland the stream runs to the east; and Humboldt says "it continues to flow to the east and east-south-east still retaining part of the impulse. In the meridian of the Isles of Corvo and Flores, the most western of the Azores, it directs itself towards the Straits of Gibraltar, the island of Madeira, and the coast of Africa, and mixes with the equinoctial current." Thus it appears from Humboldt's account that this body of water, instead of running towards the north in this part of the ocean, and thus approaching the British Isles and Norway, does not extend beyond the latitude of 40° while passing eastward, but returns towards the south to complete its circuit by feeding the tropical current beyond Madeira, which runs to the Caribbean Sea.

But we have other evidence of the state of the Atlantic in this part. In Dove's chart of Isothermal lines of the atmosphere in the northern hemisphere for the month of January, the line of

mean temperature of 50° Fahrenheit is found in China over the 30th degree of latitude, from which it rises as it passes over the Pacific Ocean to the latitude of 45° . The same line of temperature descends as it passes over the land in America until it reaches the eastern side of the Mexican mountains near Texas in the latitude of 32° . It then passes over Texas, Louisiana, Mississippi, Alabama, and Georgia, near the Gulf of Mexico, the water of which, be it remembered, is not less than 86° of temperature, that is, 31° warmer than the land, to the town of Savannah on the Atlantic coast washed by the Gulf-stream. And the same line of temperature, 50° , while passing over the warm Gulf-stream near Savannah, and over the Atlantic Ocean, ascends gradually towards the north, but does not reach the latitude of 45° until it arrives at the western longitude of 25° , near the middle of the Atlantic. Thus the mean temperature of the month of January is found to be the same in about the same latitude over the two great oceans, the respective longitudes where this takes place being, say 170° west in the Pacific, and 25° west in the Atlantic oceans. The atmosphere, therefore, over the water, in the latitude of 45° , is as warm in the middle of the Pacific as in the middle of the Atlantic. Now no one supposes that the temperature of the air over the vast Pacific Ocean, in the part named, is determined by a warm Gulf-stream; and there is no good reason to presume that the temperature over the Atlantic is so determined. A nearer approach to uniformity of temperature throughout the year is always found over deep waters than over land, which, with the operation of similar meteorological influences, are evidently the causes that determine the temperature over the two oceans.

The influence of cold winds in reducing temperature has been shown this year in the parts of the United States that are near the Mexican Gulf. The 'New York Herald' of Feb. 12, 1854, states, that "on the 23rd of January the river Brazos, in Texas, froze strong enough to bear a horse. The mercury at sunrise on the 25th was 1° , on the 26th 0° , on the 27th 1° below zero, on the 28th 0° , and on the 29th 1° , and during this time a fierce wind blew from the north and north-east." NEW ORLEANS. "For 30 days we have been visited by almost uninterrupted frost. The ice remains in the streets; the portion melted by the sun during the day is again solidified at night." The 'San Antonia Texan' of the 24th January says, "The cold weather has lasted 32 days; the thermometer has been 14° below the freezing point." At NASHVILLE "The thermometer, on the mornings of the 23rd and 24th January, was down to zero, or below."

The intense cold in those parts was evidently produced by cold wind; but what gave rise to this wind? The newspaper writers do not put such a question. A subsequent account, however, in

the same paper, of the 20th February, gives the following information. In the 'Herald' of that date it is said, "A ship left Mobile, crossing the outer bar at 10 P.M. of the 5th February, and crossing the Gulf she encountered a continuous gale of wind from the southward and eastward, accompanied by heavy rain. Left Havana on the 9th, and experienced very severe weather from the northward and westward. From Havana we learn that the constant rainy weather is fast destroying all hopes of a large sugar crop from Cuba; the pressed cane will not dry." We here learn that there had been constant rainy weather in Cuba, whilst the cold winds were blowing over New Orleans and Texas; those winds were, therefore, blowing towards the part where heavy rains were destroying the sugar crops; and the rains appear to have continued up to about the 6th February in the Gulf of Mexico, and may be considered to have produced the winds from the north.

Many, though imperfect, accounts have been furnished of the temperature of the water of the ocean in that part of the Atlantic which lies between the British Islands, and the United States of America; but it may here suffice to give some particulars from the valuable Paper which was read to the British Association at Hull in the year 1853 by Dr. Scoresby. The Rev. Doctor collected registrations of the surface temperature of the northern Atlantic whilst passing from the tenth to the seventy-second degree of w. longitude, in a belt averaging 220 miles broad, and extending from the entrance of the English Channel to Long Island, proximate to New York. He divided this belt into six portions, and the three of these nearest to America present many curious facts connected with the meeting and interlacing of the Gulf-stream, and of the cold current which descends from the Arctic regions to Newfoundland, and then passes on both the east and west sides of that island towards the south. But it is the other half of this belt, nearer to Europe, in which we are interested, and respecting which we have more particularly to inquire. For, if the Gulf-stream raises the temperature of north-western Europe, and determines its winter climate in the way that has been so confidently asserted, it is through this portion of the Atlantic that it must operate. Our inquiry, however, relates more especially to the winter climate; and a separate account of the temperature of the water at that season in the eastern half of the belt of the Atlantic is not given in as full a manner as is desirable. The accounts furnished are from averages of thirteen voyages, three only of which were made in the winter; but from what is stated this does not appear to be of essential importance. The first three of the six divisions of the belt, including the portion between the tenth and fortieth degrees of longitude, is stated to "Exhibit for the most part a striking

degree of uniformity of character; for, as far at least as longitude 38° west, no particular in the difference of surface-temperature strikes us, except a gradual rising of the means within two degrees space from $52^{\circ}-9$ to $58^{\circ}-7$ (Fah.) during a descent in the mean latitude from 50° to 46° N. This is a rise of only $5^{\circ}-8$ of temperature, whilst passing southward through four degrees of latitude, and proceeding towards the Gulf-stream *through no less than twenty-eight degrees of longitude!*

In another place in the paper it is said that in this part of the ocean the surface-temperature was not found to descend below 50° in the winter passages, nor to rise in any part of the year higher than 66° . It is also stated that steering w. by s. from longitude 12° to 36° w., and in latitudes 50° to 46° , the observations indicated an increase of the surface-temperature of only about three-quarters of a degree for each degree of latitude for the winter, and one degree for the summer. This statement, therefore, does not show that the Gulf-stream warms the northern Atlantic in the winter to the east of 40° of west longitude, and that is the only part that could raise the temperature of Europe.

But on the American side to the west of the forty-second degree of longitude the doctor found that the cold Arctic current from the north interposed *before the warmer part of the Gulf-stream* near to America was reached. He says, "Beyond the meridian of 42° , where the cold current from the north becomes first decided, an increase of its prevalency gradually becoming more and more conspicuous is observed;" and he describes numerous stripes of cold water which were crossed between 42° and 52° w. "The greatest prevalence of the polar current that is found in this section is within the meridians of 46° and 52° ." Thus it appears that between the longitudes of 42° and 52° the Gulf-stream coming from the south-west was entirely cut off from the north-eastern portion of this part of the Atlantic by cold streams from the north, leaving us at liberty to conclude that the warm water turned towards the Azores, as described by Humboldt. Dr. Scoresby therefore furnishes additional and tolerably conclusive evidence that the Gulf-stream does not go to that part of the Atlantic which is near North-Western Europe.

In the whole of the valuable paper from which the above extracts have been given, it is assumed that there are two currents in the northern Atlantic,—one, the Gulf-stream, coming from the south, and the other coming from the north; and all the secondary currents and strata which were encountered are attributed to the dynamical forces of these principal currents. But it has been shown in former papers that not only are winds the prime movers that create all the great currents of the ocean, but that wherever winds blow over it, the surface of the

water is disturbed by them ; and, when they are continued for a moderate time, that other currents are created which flow in the direction of the winds. Now, during the early part of the winter, west, south-west, and south winds prevail in the northern Atlantic ; and those winds must be presumed to create new surface-currents ; and any water that may be found in the neighbourhood of the British Islands, which has come from more southern latitudes, is likely to have been brought by the winds, and not to be branches of the Gulf-stream, as has been assumed, without adequate evidence to support the assumption. We are, therefore, authorised to infer that the warm winter climate of the north western part of Europe is not attributable to the Gulf-stream, which by its dynamical force flows from America by the Azores to northern Africa, but that it may be due to the moist south-western winds that generally prevail in the northern Atlantic.

The warming influence of a moist atmosphere is strikingly exhibited in the north-eastern part of America, extending across Davis' Straits and Greenland into the Arctic Ocean. The very cold and dry north-west wind that in the winter passes over the middle northern part of the continent of America cools its atmosphere down to a very low temperature. The isothermal line of 5° of Fahrenheit descends in the central portion of the continent to so low a latitude as 48° ; but in passing over Labrador the temperature rises rapidly, and in crossing Baffin's Bay the same isothermal ascends almost directly towards the north. It then crosses Greenland, still rising, and leaves that country in about 70° of latitude. It touches Spitzbergen in 78° , and further to the east reaches Nova Zembla ; in the whole of these more northern parts being apparently affected by the Atlantic winds. The temperature of January is thus shown to be the same in 48° of latitude over the interior of the continent of America—in 58° on the coast of Labrador—in 70° on the east coast of Greenland—and in 78° at Spitzbergen. Another winter isothermal line, that of 32° , is found over the continent in latitude 40° , but like the colder line just traced it rises in latitude as it proceeds eastward, and leaves Iceland in 64° , and further east it reaches about 69° of latitude. Thus the isothermal of 5° of Fahrenheit here rises, in the whole, through 30° of latitude ! and that of 32° of Fahrenheit ascends through 29° of latitude ! Now the rise to the north of both these lines of temperature is over the land of America in the first instance, and then over that part of the water of the ocean near America which flows from the north, known by the name of the cold Arctic current. The space that is included between these two isothermals is large, and for the greater part far remote from the locality which any one supposes the Gulf-stream to reach. But the moist southern winds of the Atlantic were found in all the

warmed parts, furnishing, through the process of condensation of vapour, fogs, and clouds; and much snow to Greenland, Iceland, and other places;—and to these winds and the vapour which they contain may be legitimately attributed the comparatively high temperature that is found over this portion of the surface of the globe.

The well-known great south-eastern current of the ocean, which flows from the Cape of Good Hope across the southern Atlantic to tropical America, is divided at Cape St. Roque, in about the latitude of 7° s., into two portions, one flowing into the Caribbean Sea, and finally becoming a part of the Gulf-stream already described, and the other running along the coast of Brazil to the south: this second part is said to approach the Straits of Magellan. But along the whole of the coast line of this part of South America, no one alleges that the winter climate of the locality is rendered warm by the contiguous warm water of the ocean. The temperature of the Brazilian coast is not so high as that of Africa in the same latitudes, and when a distance from the equator is reached, equal to that of the British Islands in the other hemisphere, the climate is not moist and warm like that of the north-west of Europe, but of an opposite character, being decidedly cool and dry. The most southern part of England is in the fiftieth degree of north latitude, and the eastern coast of Patagonia commences in about the fortieth degree of south latitude, extending 12° further to the south. Now along this line of 12° of latitude we find a winter climate the opposite of that which distinguishes the British Islands. It is throughout dry, and, speaking in general language, cold. The following is a specimen of the way in which this country is spoken of by writers who have examined it:—Captain FitzRoy says, “In July (the winter of the south) the climate of Rio Janeiro, in latitude 22° , is comparatively cool and pleasant. From Cape Corrientes, in latitude 38° , to Bahia Blanca, is a long and dreary line of coast. The most serious objection to the locality is the want of rain. Rain is seldom known during the three-quarters of the year, and even in the three winter months but little falls except on rare occasions. In winter, though the weather is sometimes searchingly cold, especially during southerly winds, the air is always elastic and wholesome.”

But it may possibly be said that eastern Patagonia is part of a continent, and that the British Islands are insular. Yet it is not easy to see how that circumstance can account for the different climatic accompaniments of the two ocean streams. The statement made is that a stream of water passing from the tropics, and bearing a certain high temperature with it to land in regions outside the tropics, communicates that temperature to the land and makes the winter climate warm for the latitude. Now if that were true,

the eastern coast of Patagonia would be warm in the winter, which it is not, and therefore that part of the world presents evidence tending to disprove the doctrine that is here combated. Not only, however, the British Islands, but the whole north-western coast of Europe, including Norway, is moist, and, for the latitude, warm in the winter.

No account represents the warm southern ocean stream off South America as passing eastward, before it reaches its terminus near the Straits of Magellan, as the northern stream does off Newfoundland. The latter stream, on leaving the Gulf of Mexico, takes its departure from Cuba on the northern tropic and runs to the latitude of 40° north, when it turns to the east, enters a wide and deep ocean, and afterwards flows back to the south; but the Brazilian stream runs directly south from the highly-heated seventh degree of latitude, keeping always near the land until it reaches say the fifty-second degree; yet it produces no sensible effect on the climates of the countries whose shores it washes, whilst it is gratuitously assumed that the northern stream has great effect in parts so remote from where it is actually found, as the British Islands and Norway, which are separated from the stream by a wide and deep ocean! Brazil and Patagonia, like the part of the United States of America parallel with the Gulf-stream, show that the warm ocean current which runs along their coasts does not sensibly warm them in the winter season, and therefore we may confidently conclude that such a stream cannot warm parts more distant from it, like the British Islands, whose connexion with it is not proved.

Reasons have been given elsewhere for attributing the peculiarly warm and moist climate of the British Islands to *atmospheric* and not to *oceanic* influences. It has been shown that these islands are warm in the winter, considering their latitudes, because vapour from the south is extensively condensed in and about them, which condensation renders the air warm and the winter climate mild in this part of the world. It is quite possible that the warm Gulf-stream may to some extent raise the temperature of the Atlantic up to the latitude of 40° , and thus supply a little more vapour to be condensed in north-western Europe. This, however, is not what is advanced by those whose opinions are here combated, as, according to them, the Gulf-stream itself reaches north-western Europe, and its vicinity to the land is alleged to produce, by the ordinary influences resulting from contiguity, the warm climate—an opinion altogether unsupported by evidence. It may be remembered also that evaporation is a very cooling process, and to that process the water of the Gulf-stream is exposed in the wide expanse of the Atlantic, where, as the surface water cools, it sinks, and warmer water rises to go through the same process.

But there are other reasons for believing that the climate of this

part of the world would continue what it is at present, supposing the temperature of the Atlantic to become hereafter entirely unaffected by the Gulf-stream. Oregon, New Albion, Vancouver's Island, and other parts of the north-western coast of America up to 60° of latitude, have warm winters like the British Isles and Norway, and it has never been asserted that the immense surface of the northern Pacific Ocean is warm beyond what is due to its depth and latitude. There is a current from Japan running into the northern Pacific, which may possibly produce some little effect on the temperature of the western part of this wide ocean; but no one has attributed the mild winter climate of the north-western coast of America to the warmth of the Japanese stream. This part of the world may, therefore, be said to present evidence against the supposed influence of the Gulf-stream.

But, in addition to the evidence furnished by the northern Pacific, there is another part of the world which shows that a warm winter climate, such as that of the British Islands, may be produced at a great distance from tropical regions, and where no one can imagine that it has been caused by a warm ocean current. This part is western Patagonia, Tierra del Fuego, and Cape Horn, extending from 40° to 54° of southern latitude on the west coast of South America. No warm oceanic current flows from tropical regions to these countries! On the contrary, a very cold current runs from them to a warm region, taking cold water near to the equator! That the extraordinary high winter temperature of Cape Horn and the other countries named is due, not to a warm adjoining sea, but to condensation of vapour, scarcely admits of dispute, as no cause for the warm climate but the condensation of vapour can be traced, and that is so abundant as fully to account for the warmth. In the increasing trade now carried on between Australia and this country, ships usually pass across the southern Pacific by Cape Horn to England. To accomplish this by the shortest route, navigators adopt the improved system of great-circle sailing and run far to the south, and there they find both an atmospheric and an oceanic current setting from the frigid region of Victoria land in nearly 70° of latitude to Cape Horn, Tierra del Fuego, and western Patagonia, which are within the latitudes of say 55° and 40° . The ocean current which washes these shores, therefore, flows from a cold to a warmer latitude, and cannot warm the land. But a wind blows not only from Victoria land, but also from New Zealand across the whole extent of the southern Pacific to Cape Horn and western Patagonia. Now this wind, passing over so great an extent of water, becomes as fully charged with vapour as is compatible with the temperature, and a large quantity of this vapour is found to be almost regularly and constantly condensed against the hills and mountains of the western side of the southern extremity of

America. Here it evidently produces the warm winter climate of this part of the world, which has so much surprised those who have remained in it during that season.

Attention has already been directed to this extraordinary meteorological region (see page 111 of 'Atmospheric changes,' &c.); but it may be well to give here short extracts describing it. Captain FitzRoy says: "The climate of western Patagonia is so disagreeable that the country is almost uninhabitable. Clouds, winds, and rain are continual in their annoyance. Perhaps there are not ten days in the year on which rain does not fall, and not thirty on which the wind does not blow strongly, yet the air is mild and the temperature surprisingly uniform throughout the year. The country is like the worst parts of Tierra del Fuego, a range of mountains half sunk in the ocean, barren to seaward, impenetrably wooded towards the mainland, and always drenched with the waters of frequent rains, which are never dried up by evaporation before fresh showers fall." . . . "As yet I have found no difference in Tierra del Fuego between summer and winter, excepting that in the former the days are longer and the temperature is, perhaps 10 degrees higher."—Vol. ii., pages 142 and 390.

The strong winds which blow in this part extend to the Falkland Islands, which partake of the climate of Tierra del Fuego. Of these Captain FitzRoy says: "The winters are mild, the temperature being seldom so low as the freezing point. Wind is the principal evil at these islands; a region more exposed to storms, both in summer and winter, it would be difficult to mention. The prevalent direction of the wind is westerly."—Pages 243 and 264.

Here we see that the vapour which is brought from the wide expanse of the southern ocean is condensed in this locality and warms it.

There is a certain degree of resemblance between these islands in the southern Ocean and Iceland in the north Atlantic. Both have currents of cold water flowing on them from Polar regions. The Falkland Islands, as well as Tierra del Fuego, are wet, and, for their latitude, warm in the winter. The cold Polar oceanic current from the Arctic regions brings large quantities of ice to the north side of Iceland, yet that island, extending from 63° to 66° north, is very warm for its position. But it has either copious rains, brought from the Atlantic, or heavy falls of snow. Its winter temperature is therefore high. The coast of Norway, evidently from the same causes, partakes of the winter climate of Iceland. Dillon says, in his *Winter in Lapland*, when at Bosekope on the Alten Fiord, "It was the 26th January, yet no ice was visible in the bay." And when writing of Iceland he says, "In Quebec the mercury fell 32° below zero, and although I have never seen it, by many degrees, so low in Iceland, I can remember many occasions when

the cold has appeared to be more intense. I account for this difference by the severity of the weather in Canada and the awful gales that never ceased to blow in Iceland. Often have I been obliged to turn back, finding it useless to urge my horse against the wind. In the course of an hour the whole front of the house, up to the roof, was snowed up."—Page 167. There is also another point of resemblance. Tierra del Fuego is in a colder latitude than eastern Patagonia, which is both dry and cold in the winter; and Labrador and Canada are also dry and have winters much colder than those of Iceland. The vapour which warms the parts in the colder latitudes, in both hemispheres, does not reach the parts which are in the warmer latitudes, and the latter are, therefore, without the warming influence of that condensation. These two localities in opposite hemispheres furnish evidence that oceanic currents have but small direct effect on climate, and that condensation of atmospheric vapour has great effect. Iceland, there is no doubt, is made warm in the winter by condensation of vapour often followed by congelation, and there is good reason to conclude that the same influences affect the British Islands and other parts of north-western Europe.

It is, however, quite possible that water from the Northern Atlantic is, to some extent, taken towards the Polar regions in the winter. Winds from the south are there frequent, blowing as far as Spitzbergen and Nova Zembla, and, by pressure on the water over which they pass, these winds may take some water with them from the south; but it is quite unnecessary, and certainly is unwarranted, to assume that the dynamical force of the Gulf-stream sends warm water to this remote part, say, from 40° to 70° or 80° of latitude! Products of warm climates, it is well known, have been occasionally floated to the shores of northern countries; but it has been assumed, and not proved by reasonable evidence, that they have been brought by the Gulf-stream. It is, however, far more likely that they are taken by wind and the surface-currents produced directly by it. A wind passing over water acts on any object that is floating on the surface, and carries it forward more rapidly than the water flows. To the action of the wind, or to the water put in motion by it, or to both, we may then attribute the floating of southern products to northern parts of the Atlantic.

Condensation of vapour to a large extent takes place among the hills and mountains of Ireland, Scotland, and England, as may be inferred from the falls of rain. The winter rains are heavy against the Kerry and other mountains of Ireland. In the Isle of Skye, to the west of Scotland, at Cuchullin Lodge, 141 inches of rain fell from the 1st of August, 1850, to the same date in 1851. In January alone there fell 27.7 inches. In many parts of Cumberland above 100 inches have been registered in the year; and in

one part, 189 inches! Along the western sides of all the mountains of the islands heavy rains fall, especially in the latter half of the year extending into winter. Condensation in these parts is, therefore, very abundant, making the atmosphere misty, rainy, and warm when tested by the thermometer.

The Pyrenees, the Alps, and the German, as well as the Scandinavian mountains, have their degrees of influence in condensing vapours brought from the Atlantic, and by the vacua created about them, drawing further supplies to render western Europe, especially in the parts near the sea, warm in the winter. Each locality in this part of the world is, in the cold season, warmed in proportion to the amount of vapour condensed in it. The thickly shrouded and drizzling atmosphere of the western islands of Scotland in latitude 58° , constantly giving out heat of condensation, is warmer than that of London in the winter; but, then, six-times the quantity of rain has been known to fall in the former place that descended in the latter; and more rain has fallen in the Isle of Skye in the month of January, than fell in London or Paris in the whole year.

From these various facts and considerations we are, then, warranted in coming to the conclusion that the belief of the mild winter climate of the British islands, and of the seaboard of north-western Europe being due to the Gulf-stream, is an error; and that the superior warmth of the part is attributable to condensation of vapour—such as evidently warms, in the winter, Cape Horn, Tierra del Fuego, Western Patagonia, and various other parts distant from the Equator.

Shortly after this paper was read to the Manchester Literary and Philosophical Society, there appeared in the 'Manchester Guardian' newspaper the following Meteorological Report from Mr. J. L. Casartelli:—

	Temperature in Shade by Self-registering Thermometer.			Difference between Wet and Dry Ther- mometer at 2 P.M.	Direction of Wind at Noon.	Daily fall of Rain.	Weather.
	Maximum.	Minimum.	Difference.				
1855.							
Dec. 10	35°	29°	6°	4°	N.W.	..	Fair and frosty.
„ 11	31	25	6	3	N.W.	..	Ditto.
„ 12	32	25	7	3	N.W.	..	Ditto.
„ 13	52	21	11	3	N.W.	..	Ditto.
Mean	32.50	25	7.50	3.25	N.W.	..	Ditto.

On the 14th of December a change of weather took place as follows:—

Dec. 14	45	30	15	1	N.W.	0.10	Cloudy.
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Here we have a great change of temperature without any alteration in the direction from which the wind came. The great change which took place was evidently in the quantity of vapour in the air. The minimum of the dry thermometer had been a mean of 25° , and the wet-bulb thermometer was $21^{\circ}75$, showing a difference of $3^{\circ}25$ of dryness. But on the 14th the minimum of the dry thermometer rose from 25° to 30° , and the wet-bulb rose from $21^{\circ}75$ to 29° ; showing that on the 14th there was much more vapour in the air than there had been during the previous four days; and an effect of this increase in the quantity of vapour was experienced in the fall of one-tenth of an inch of rain on that day. The maximum temperature on the 13th was 32° , from which it rose the next day to 45° , though the wind continued in the same direction. What then could raise the maximum temperature 13° in one day? It could not be the air, because it came from the same cool quarter that it had come during the previous four days. It could not be the direct action of the solar rays, as we see that the sky was cloudy, although it had previously been clear. It could, therefore, only be the condensation of the more abundant vapour to a sufficient extent to warm the gases, and raise their temperature 13° : and this warming seems to have produced an ascending current, which showered down a tenth of an inch of rain.

Similar risings of temperature are experienced in other places. In the London 'Spectator' of Dec. 29, 1855, is the following article:—

"The great change of temperature that occurred between Saturday and Sunday was not confined to London. Saturday it was intensely cold. Next morning, June seemed to have elbowed out December, and the warmth of the atmosphere out of doors oddly contrasted with the chill within. . . . It is stated, that at Paris." . . . "By one of those violent changes to which the Parisian climate is so peculiarly liable, we were yesterday suffering from the most poignant cold, and are to-day steeped in unnatural humidity and warmth. The aspect of the city yesterday (the 22nd) was of a most Muscovite description. The cold had descended to nearly 11° below freezing, and, in consequence of the excessive dryness of the atmosphere and the brilliant sunshine, though seemingly devoid of all warmth, the dust from the macadamized streets lay almost as thick, and rose in clouds as offensively as in the dog-days. Everything freezable was fast bound by the icy fangs of as keen a wind as ever blew across the Place de la Concorde, whose basins were converted into solid blocks of ice clear as glass and many inches thick. The moon rose upon an equally stringent state of things, and even some time after midnight no symptoms of a change were visible. At 8 A.M. this morning, if not earlier, a soft rain was falling fast, and the change in the temperature could be hardly less than 30° ."

Are not such cases as these proofs that aqueous vapour is a most important agent in conveying heat, which, when liberated from its chemical union with water, extensively modifies climate? To such an agent we may attribute the generally mild winter-climate of the British islands.

X. — *Remarks on Serpent Island.* By CAPTAIN T. SPRATT,
C.B., H.M.S. Medina.

Communicated by the LORDS COMMISSIONERS of the ADMIRALTY.

Ed. June 8, 1857.

See Admiralty Map of 1857.

THIS little island, independent of the question of right, formerly in dispute, has several points of interest peculiar to it. First, from its local position, as the eye of the Danube; and also from being the only real island, small as it is, in the Black Sea, deserving the appellation.

Nature thus seems to have placed it there on purpose to be a beacon or shield for the approach to the low shore and shallows that extend from the mouths of this great European river, the delta of which has a sea-coast of the same low character of more than 50 miles in extent, and nowhere 2 feet above the sea.

By its mineralogical character also it is peculiar, since it cannot be claimed or be said to be a part of either the Dobrutcha or Bessarabia from any identity of their approximate coasts. Neither can the Danube claim it as a creation from its deposits. The composition or geological character of its rocks show that it is a fragment of the older group of strata which form the mountains surrounding the south-western division of the Black Sea, Bulgaria, &c.; and it thus appears to be an outlying peak or fragment of the schistose group of rocks that occur in the north part of the Dobrutcha, near Besh Tepeh and Toulteha; for it is composed of siliceous strata, containing large crystals of quartz, and passes sometimes into red jasper. The strata are separated by thin bands of friable shale, and attain a thickness of nearly 200 feet, their dip being from 10° to 20° to the E., and the height of the island 130 feet above the sea.

From this description of the nature of the island it is thus evident that it has no connexion with the low, flat country of Bessarabia, as I have heard it often stated. For this coast, and also the interior of the country, as far as could be seen from the Medina's masthead, anchored off it, appears not to be 20 feet above the sea anywhere, and to be composed of the earthy marl, which forms the surface of the level steppe generally. Indeed, the coast of Bessarabia to the N. of Serpent Island is hardly above

the level of the vegetation (reeds and rushes) which grow on the delta of the Danube, and thus appears from sea as a part of it.

From its antiquarian associations Serpent Island has also some interest, for the Hellenes believed that Achilles made this his final abode; and a temple of some celebrity existed on the island dedicated to that god and hero.

The accompanying plan of the island and view shows that it is about one mile in circumference, and surrounded for the most part by precipitous cliffs from 60 to 100 feet in height, with deep water near their base.

The island is nearly of the shape of a triangle, but with one of its angles prolonged into a small, level promontory, about half the greatest elevation of the island. This little promontory has a landing-place on either side of its neck, on a beach of large shingle, with a road or path cut through the cliff or bank on the north side; but on its side, where the landing is better, there are remains of a terraced road, formed of rude blocks, which are of a Cyclopean style, and evidently of a very early date. On reaching the top of this promontory the interest in its antiquarian association is more fully awakened on seeing its surface almost composed of fragments of ancient pottery,—pieces of vases, patera, and amphore lying in great profusion, and the ground in such a condition as to show that not many years since the entire surface has been dug over in search of these and other relics. But the pottery appears to have been wantonly destroyed, as being little appreciated in a search that was most likely made for articles of more intrinsic value—coins, &c. After a little search among the heaps of pottery, I found several fragments with parts of Greek inscriptions upon them, which had been both stamped when the clay was soft, and also scratched on the surface after being hard, and painted. Some of the paintings were in black and others in red, being figures of animals and ornamental designs, but none entire, yet forming parts of very elegant vases and patera when perfect, and indicated an early occupation of the island. There were fragments of glass and brazen vessels also among the heaps of broken pottery. The handles of large jars, apparently for water, were so plentiful, that they indicated the existence of a settlement or collections of habitations on this little promontory, as well as its having vestiges of buildings; but none of the character of a temple, which must have stood upon the summit of the island, where are still lying several squared blocks of marble 4 or 5 feet in length, one of which had some, almost illegible, Greek characters; and two or three others, which had mouldings, seem to have formed the slabs of a small pediment, and are, I think, vestiges of the temple of Achilles.

On the western part of the island there are also more evidences of the very early occupation of the island, the surface being inter-

sected with the foundations of long walls, formed of rude blocks, that bear an Hellenic type, and seem to have formed divisions of property when it was entirely cultivated, for the surface of the island is for the most part formed of a rich, black earth, 2 and 3 feet deep. There are also some evidences of detached buildings of the same character, and three very ancient wells.

These remains evidently indicate an occupation of the island at the earlier period of Greek history, and lead to the idea that it may have been occupied as a trading depôt by some Hellenic community that traded with the Danube and the adjacent low country, the distance from the coast rendering it safe from the insalubrity of the marshy delta and from molestation of the natives. For it is by nature almost formed into an impregnable sea-fortress for such a depôt, and by its elevation was a beacon or landfall for the adjacent coast to the bold navigation seeking for it in those days.

The fullest account of the island in ancient times is given by Arrian in his '*Periplus of the Euxine*,' or rather in a letter addressed to the Emperor Hadrian, detailing a voyage round the Black Sea, from which I make the following extract:—

"Thetis is said to have given up the island to her son Achilles, by whom it was inhabited. There are now existing a temple and a wooden statue of Achilles, of ancient workmanship. It is destitute of inhabitants, and pastured only by a few goats, which those who touch here are said to offer to the memory of Achilles. Many offerings are suspended in this temple, as cups, rings, and the more valuable gems. All these are offerings to the memory of Achilles. Inscriptions are also suspended, written in the Greek and Latin languages, in praise of Achilles, and written in different kinds of metre. Many birds inhabit this island, as sea-gulls, divers, and coots innumerable. These birds frequent the temple of Achilles every day; in the morning they take their flight, and having moistened their wings, fly back again to the temple, and sprinkle it with the moisture, which having performed they brush and clean the pavement with their wings. This is the account given by some persons. Those who come on purpose to the island carry animals proper for sacrifice with them in their ships, some of which they immolate, and others they set at liberty, in honour of Achilles. Even those who are compelled by stress of weather to land upon the island must consult the god himself whether it would be right and proper for them to select for sacrifice any of the animals which they should find feeding there, offering at the same time such a recompense as to them seems adequate to the value of the animal so selected. But if this should be rejected by the oracle—for there is an oracle in this temple—they must then add to their valuation, &c. A considerable treasure is thus laid up in this temple as the price of these victims."

The existence of this temple to Achilles caused the island to be also called Achilles by some ancient authors, and hence from its light colour, by others; and, although Arrian says it was uninhabited in the time of Hadrian, there is no doubt, from the remains upon it, that it was inhabited at an earlier period, and probably in the first instance for the objects I have noted.

The modern name of Fido Nisi, or Serpent Island, has no doubt arisen from these animals having multiplied upon the island

since its desertion; and they are still very numerous, being veritable sea-serpents or water-snakes, that live upon the fish in the sea and inhabit the cliffs of the coast. More than twenty were seen coiled together under a shelving rock that received the rays of a warm October sun; and many having fallen into the wells and cisterns, and died there, the water in them is not now drinkable; so that water for the Turkish troops is obliged to be brought from the Danube. The serpents are jet black, except along the abdomen, which is whitish; they have a small head, and are from 4 to 5 feet long, and, although said to be harmless, are a very disagreeable-looking species.

The lighthouse now standing upon the summit of the island was erected by the Russians, and is built of brick imported for the purpose. the tower is 50 feet high, and now shows a beautiful revolving light of the second order, which has been recently placed on it by the Turkish government, and was first exhibited on the 15th of October.

This account of Serpent Island, which recent events connected with its disputed occupation by Turks and Russians render of some interest, leads to the consideration of the utility of this island, and perhaps from that the strongest claimant on grounds of real local interest.

It has been shown that if territorial identity be in any way considered a point of right, that right is more in favour of Bulgaria on the Dobrutcha than of Bessarabia. The delta of the Danube is, however, its proximate shore, from which it is distant about 24 miles, being equally distant from the mouth of the Kilia and from Sulina, but actually visible from neither, although the lights of Sulina and Serpent Island may often be seen from each other.

There can be no doubt but that the existence of this rock so immediately off the mouths of the Danube has been a great advantage to vessels bound for the river; for the island being high and bold it can be approached without danger. A vessel thus arriving during a N.E. gale, when the river cannot be entered, may anchor under the island in the summer season, or lie to, on and off, merely keeping the island in sight, so that when the weather is at all favourable she can shape a course with certainty for the river, and thus take advantage of the first favourable moment for entering.

Serpent Island is thus the eye and shield of the Danube, for it is the seaman's beacon or safeguard against falling upon the shallows of the low coast, when, from the influence of currents and the absence of observations for several days, as is usual in N.E. winds, he would, from the uncertainty of his reckoning without such a beacon, either lose much time by keeping too great an offing, or be embayed or stranded on a lee-shore, through ap-

proaching it too close at an unfavourable moment, from ignorance of its true position, until too late to be avoided.

When the *Medina* anchored off the s.w. point of Serpent Island at the close of a N.E. gale, she found four vessels lying under shelter of the island, at about one cable from the shore, in 12 and 15 fathoms. The bottom is fair holding ground in that depth all round the island, and seems to consist of mussel-shells and mud, into which the anchor sinks. Arrian mentions that the island was a refuge for the mariner in stress of weather in the earliest days. Thus it is evident that, by the addition of a light upon it, the island is rendered doubly valuable to the navigation and trade with the Danube, and to this trade therefore the island is of special use and importance. It is true that vessels bound for Odessa may benefit by this light in rectifying their course; but to that trade it is not so much a necessity as to the Danubian, because Odessa has a high coast on either side, and has its sea-warning in the advanced and elevated light upon Cape Fontana in addition to its port lights. Therefore it is clear that to the trade of Odessa Serpent Island is not a necessity, although sometimes serviceable; for it must be borne in mind, in considering this question, that Serpent Island is not a danger, but Nature's sea-beacon, being high and bold, and by the addition of the light the position of the beacon is merely made as visible by night as by day at the greatest possible distance.

XI.—*Hydrography of the Valley of the Arve.* By Professor PAUL CHAIX, of Geneva, Corresponding Member of the Society.

Communicated by the SECRETARY.

Read, June 8, 1857.

HAVING last year given some time and care to the study of my country, under an hydrographical point of view, I collected as many of the existing documents as I could procure, and attempted to add to the scanty stock, some observations of my own on the basin of the Arve. Although, strictly speaking, that river flows mostly through the Sardinian territory, I thought it was too closely connected with Switzerland to be neglected, especially as it is more directly within my reach.

The river Arve is the most considerable of the Alpine tributaries of the Rhone, more from its size than from the extent of country it drains, which covers an extent of 385 square miles on the northern or right side of the river, and 386 on its left or southern bank; being a total of 771 square miles. Its boundary line winds along the crest of mountains over a length of 64 miles on the northern side and 93 on the southern. Of the total surface of the basin, 82 square miles are covered with glaciers and constant snows.

The number of tributaries is 16 on the right side and 17 on the

left; 11 of the number are formed from the snow and ice waters. The most important tributaries are—on the right the Giffre, with a course of 26 miles, and the Menoge, with one of 16; on the left side the Bonnant is 14 miles long, and the Borne 18: the Arve itself having a course of 65 miles.

Positions.	Height above the Level of the Sea.	Fall of the Trunk.	Length of the Trunk.	Fall per Mile.
	Eng. feet.	Feet.	Miles.	Feet.
The spring, near the village Du Tour ..	4277	..	..	..
Chamounix	3414	863	7	123
Saint Martin	1781	1633	16	102
Cluse	1587	194	10	19
Bonneville	1450	137	9	15
Mouth of the river Menoge	1387	63	11	6
Mouth, confluence with the Rhône ..	1222	165	9	18
		3055	62	50 average.
<i>The Bonnant.</i>				
Plan of Mont Jovet	6235	..	..	..
Nant Bourant	4520	1715	2	857
Notre-Dame de la Gorge	3900	620	$\frac{3}{4}$	910
Mouth, into the Arve	1886	2014	$9\frac{1}{4}$	214
		4349	12	362 average.
<i>The Giffre.</i>				
Bottom of the Combe, valley of Sixt ..	3811	..	..	..
Sixt (Abbey of)	2443	1368	6	228
Sixt (entrance of the valley)	2355	88	$1\frac{1}{4}$	70
Samoëns	2329	26	2	13
Tanninge	2115	214	7	30
Marigny	1568	547	8	68
Mouth	1535	33	2	16
		2276	$26\frac{1}{4}$	87 average.
<i>The Nant, or brook of the Reposoir.</i>				
Reposoir from the Carthusian convent to Scionzier .. .. .	..	1994	5	400
<i>The Borne.</i>				
Great vg. of Bornand	4231	..	..	..
Lesser Bornand	2371	1860	6	310
Bonneville	1450	921	6	153
		2781	12	232 average.
<i>The Menoge.</i>				
Habère Lullin	2834	..	..	..
Bonne	1604	1230	$9\frac{1}{2}$	129
Bridge of Trebille	1387	217	$4\frac{1}{2}$	48
		1447	14	103 average.

The above table shows what is the slope of the river and of its tributaries—the latter presenting a more rapid fall than the main river. The only exception is found in the more even plain, through which the Giffre flows after it has issued from the valley of Sixt, through the deep and narrow chasm called la Tine.

The bed of the Arve is of a very irregular width, in average from 80 to 95 mètres, or 260 to 311 feet English measure, widening in some places, and after heavy rains, to about half a mile. One such reach is to be found, 3 miles long, above Saint Martin, and another of 12 miles below Cluse. Embankments have been raised in order to deepen and rectify the bed over an extent of $4\frac{1}{2}$ miles above Bonneville, and along the last two miles of the course of the Borne. The bed is very much exposed to be divided by the accumulation of sands and gravels, which form in the middle narrow shoals of an elongated shape, called herrings. They have the inconvenience of throwing the current from the middle channel to each bank, encroaching upon cultivated lands, while it widens the bed by the formation of unproductive gravel banks; the more so as the main stream very seldom keeps to the same bank, but, on the contrary, is alternately thrown from the right to the left by every herring in succession. In those places where the banks of the river are steepest they are raised from 28 to 36 mètres (92 to 108 feet) above the level of the water.

The average temperature of water is 45° Fahr. (7° Centigrade). I found it on the 24th of July, at $1\frac{1}{2}$ o'clock in the afternoon, at Bonneville, $56\frac{1}{2}^{\circ}$ Fahr., while the air was 72° Fahr. Early in the morning, while the air was at 53° Fahr., I found the water of the Arve at $48\frac{1}{2}^{\circ}$ Fahr. and that of the Borne at 50° . On the same day, at $11\frac{1}{2}$ o'clock in the morning, I found the water of the river Giffre, at Marigny, at 13° Cent. ($56\frac{1}{2}^{\circ}$ Fahr.), while the air was at 71° Fahr. very much the same as the Arve. Observing the temperature of the Giffre, at the bottom of the valley of the Sixt, where it issues from under a deep bed of snow, I found it as high as 45° Fahr. It is true that before reaching that bed of snow they fell several hundred feet from the glaciers, being very likely heated in their fall by the contact of the air and by a very powerful sun.

I found this year the temperature, at the bridge below Carouge, was in the latter half of May $10\cdot1^{\circ}$ Centigrade in the morning, and $13\cdot0^{\circ}$ in the evening—in June, $11\cdot1^{\circ}$ in the morning, $13\cdot7^{\circ}$ in the evening—in July, $11\cdot4^{\circ}$ in the morning, $12\cdot1^{\circ}$ at noon, and $14\cdot3^{\circ}$ in the evening—in August, $11\cdot0^{\circ}$ in the morning, $11\cdot2^{\circ}$ at noon, and $12\cdot0^{\circ}$ in the evening—decreasing from the middle of the night to 9 and 10 o'clock before noon, and increasing even till 9 and 11 in the night.

From the fact that the waters of the Arve reach their highest level in the neighbourhood of Geneva from four to seven o'clock in the

morning (generally $5\frac{1}{2}$), it may be inferred that they are not more than 12 or 14 hours in running from Chamounix to the latter place. I found the rapidity was 1·8 mètres (5·9 feet) per second at Bonneville, in the middle of the channel, on the 24th of July. It, of course, depends very much upon the changes in the depth of the water. My most accurate and numerous observations have been made from a small wooden bridge, 620 mètres below the town of Carouge; the slope between that bridge and the stone bridge at Carouge being 6·2 feet (1·9 mètres) in a distance of 620 mètres, from 377·2 mètres to 375·3 mètres above the level of the sea. The mouth of the Arve into the Rhone is 372·7 above the sea, and 1600 mètres or 1 mile below my station.

I subjoin here the results of some of my measures of the rapidity of the stream, where greatest, with the corresponding levels of the waters, such as I read them on the scale:—

Height of the Water at the Scale.	Greatest Depth of the Section.	Rapidity in a Second.	
		Where Greatest.	Where Least.
Mètres.	English feet.	English feet.	English feet.
0·24	5·9	6·41	0·8
0·32	8·0	7·54	0·65
0·77	8·8	7·54	2·4
0·80	9·1	6·56	3·0
1·08	9·7	9·02	1·6
1·98	10·8	9·84	5·5

The rapidity of the Rhone, within the limits of our Canton, has been found 1·7 mètres (5·6 feet) at least, and 4 mètres (13·1 feet) at most; and at Lyons it is 2·50 mètres (8·2 feet) in a second. The amount of rain-water, collected by the basin of the Arve, may be said as unknown, having been as yet observed at Geneva only, where it is 33 inches yearly.

In order to know the body of water that flows in the bed of the river, I measured a transverse section of its bed by a sufficient number of soundings at the above-mentioned wooden bridge, where it is 243·5 feet wide, and I divided it into ten separate trapezoid channels, of which I ascertained the volume by as many measures of the rapidity of the water at its surface, calculating the average rapidity by means of Arnott's formulæ.

It might have been expected that, having once taken accurate measures of the depth in each of the ten sections, when the waters were at their lowest level, I would have been spared the trouble of new soundings for every time I measured the rapidity of the water in order to calculate its volume, by merely adding to the depth of every partial section such increase of the height of the level which I read on the scale. Such, however, has not been the case, on

account of the great changes almost daily worked in the bed of the river by erosion and by the accumulation of shingle and sand. This accounts for my having found rates of rapidity and of depth in some of my partial sections, which but seldom kept pace with the changes in the general level. It is the only way in which I can explain those discrepancies.

The total body of water discharged by the river in one second :—

Height of the Water at the Scale.				
Mètres.				English Cubic Feet.
0·24	..	..	..	1,906
0·32	..	..	..	2,524
0·77	..	..	..	10,520
0·80	..	..	..	9,442*
1·08	..	..	..	12,002
1·98	..	..	..	17,367
2·50	..	..	..	22,397

The 0· mètres of the scale has probably been placed below the lowest level the waters ever subsided to ; but I have never seen them so low. When reduced to that lowest level, they still preserve a maximum depth of 1·56 mètres, or 5·1 feet in the bed. The highest level which I observed, namely, 2·50 mètres above 0· mètres, occurred on the 20th of October, 1855, at 1½ o'clock in the afternoon, after nine days of rainy weather. The river is known to have risen to more than 1 mètre above that point. Mr. O'Brien, a French engineer, found the produce of the Arve 38 cubic mètres (1341 cubic feet) in a second at the lowest state of the waters, and 354 cubic mètres (12,496 cubic feet) in summer. These two numbers may be considered as representing the regular volume of the river at the two opposite seasons of its low and high waters, when there are no rains in the country ; they differ as 1 to 9. Rivers which are fed from snow and ice waters seldom present a greater regularity in their volume. The Rhone, at its outlet from the lake of Geneva, has been found to give in its low state about 200 cubic mètres (7060 cubic feet), 700 cubic mètres (24,710 cubic feet) at its highest level, and 424 cubic mètres (14,861 cubic feet), when measured by MM. de la Rive, Colladon, and General Dufour, on the 24th of September, 1840. When we bear in mind that this river owes its changes of volume to the same cause as the Arve, its tributary, we see what is the regulating power of such a basin as the Lake of Geneva ; it lets out the waters of its emissary in much more regular quantities than it receives them from its tributaries.

When the summer is dry, the variations in the quantity of the

* The fourth measure, corresponding to a level of 0·80 mètres, is erroneous, from my having been but indifferently provided with the means of measuring it the time when I took it.

waters of the Arve are very regular : 21 readings of the scale have given 0·80 mètres for the average height of their level during the month of July ; 45 readings have given 0·64 mètres for the average of August ; 37 readings have made the average of September 0·55 mètres ; 0·28 mètres for the first week of October ; then came 11 days of rain, which raised the monthly average to 0·85 mètres. It has been only 0·33 mètres in November ; 0·32 mètres in December ; 0·42 mètres in January ; 0·36 mètres in February ; 0·30 mètres in March ; 0·51 mètres in April. One single day of rain during the long droughts of a summer seldom raises the level of the water more than 0·2 mètres, if at all ; the rain-water being then absorbed by the dry soil. But, when the rains set in for a few days, they become a much greater cause of increase of the body of water than any degree of heat working upon the snows and glaciers of the Alps. From a comparison of the monthly-average levels of the river, I find that the yearly average is 0·53 mètres, corresponding to the monthly-average heights of May and September. The body of water discharged by the Arve, when it is at that level, may be taken as a mean or average quantity of water in a second all the year round. This I have found to be 122·06 cubic mètres in a second, or 4308 cubic feet.

Having noticed that during a series of fine days the level of the water is invariably higher early in the morning than it is in the evening, I concluded, in accordance with former observers, that the greatest body of the waters from Chamounix are 12 or 14 hours on their way to the neighbourhood of Geneva. In order to know what may be the difference in the quantities produced by the glaciers during the night and during the greatest heat of the day, I compared a certain number (21) of readings of the level in the evening with an equal number of readings given by the scale in the early part of the morning, and found for the latter 0·69 mètres, while the average level of the former is only 0·62 mètres. I picked out only readings made during a long series of fine dry and warm days of July and August, taking care to exclude the colder and rainy months, when the difference is gradually reduced to nothing between the produce of the day and that of the night. Combining together the breadth of the river and its rapidity, both at the levels of 0·69 mètres and 0·62 mètres, I calculated that difference of level between the waters of the morning and of those of the evening amounts to a difference of 11 cubic mètres, or 388 cubic feet in a second ; or, as there are during the longest days of the year eight hours in the day during which the rays of the sun act powerfully upon the glaciers and snows, the melted fluid produce of those eight warm hours may exceed that of as many cold hours by 316,800 cubic mètres, or 11,174,400 cubic feet ; which produce amounts to 136,274 cubic feet for every one of the 82 square miles of snows and glaciers in the three valleys of Chamounix, Montjoie, and Sixt.

In order better to know what is the real body of water derived from the two first of the foregoing valleys by the Arve itself, I took separate measurements of its only important tributaries—the Giffre from the valley of Sixt, the Menoge from the valley of Boège, and the Borne from the valley of the Bornands, at a time when the level of the whole Arve near Carouge was 0·77 mètres, and its volume 298 cubic mètres (10,520 cubic feet) per second. The body of the Menoge was found 1·9 mètres (57 cubic feet), and the Borne 4·7 mètres (166 cubic feet) in a second. Lastly, and on the same day, the 24th of July, I took very accurate measurements of the Giffre at Marigny, 2 kilomètres above its confluence with the Arve, dividing its wet cross-section into nine separate parts, of which I measured the width, the depth, and the rapidity. I found the whole width of the river 34 mètres, or 111·5 feet, its greatest rapidity 2·2 mètres (7·2 feet) in a second; the surface of its wet cross-section 19·7 square mètres, and its produce 36·52 cubic mètres in a second, or 1289 cubic feet. If I take from the body of the Arve, at Carouge, 298 cubic mètres, or 10,520 cubic feet, the sum of its three tributaries—the Giffre, the Borne, and the Menoge—together 43·12 cubic mètres (1512 cubic feet), I find the body of the main branch, the collected waters of the valleys of Chamounix and Montjoie, is 9008 cubic feet, or 255 cubic mètres in a second.

XII.—*Observations on the Water of Wick.* By JOHN CLEGHORN.

Communicated by Sir RODERICK I. MURCHISON.

Recul, June 22, 1857.

I ENCLOSE a plan of our Bay made in 1814. You will observe that the sand is all on the south side of the river, and that Pulteneytown Harbour has been built on this sand-heap.

The south side of the Bay is the shallow or sandy side, the north the deep side. Below the sand there is a vast accumulation of large boulders, called on the plan “North Odd,” “South Odd.” These boulders form an incoherent pavement, partially covered with sand. On the north side there is a larger area occupied by them, and freer from sand than on the south side. Every puff of wind moves the sand; the boulders are set in motion by storms only, but, like the sand, they too are travelling to the south side of the Bay.

In the character of the stranded blocks on each side of the Bay there is a marked difference. Those on the north side, under the influence of high spring-tides only, are nearly all angular, and have been torn from the edges of the sunken ledges that margin its side; but on the south side the stranded boulders are nearly all water-worn, similar to those forming the “North and South Odd.”

On the north the stranded blocks are all black, and this black coating is of vegetable matter, showing that they are at comparative rest; but on the south side the boulders are naked and chafed. They are not at rest.

Thousands of tons of water-worn, naked, and chafed boulders are lying in a vast heap at the back of the south quay, and in the sheltered reaches farther out in the bay there are large masses; between the quay heads there are numbers, and for many years past huge boulders in great numbers have every year been removed from the fair-way.

To keep Pulteneytown Harbour comparatively clear of sand and boulders, unremitting attention is required from the harbour authorities, and much money is yearly expended.

When Captain Washington was here in 1849 I pointed out to him some of the evils that assail the harbour, and so cogent were they, in his estimation, that he recommended Government to grant 10,000*l.* for the Improvement of the RIVER Mouth. See Captain Washington's Report.

It would be well if we could satisfactorily answer the questions:—Why does the sand accumulate on the south side of the Bay, and why do the boulders tend to that side? Why is the north side the deep side, and the south the shallow or sandy side of the Bay? We may be helped to a solution of these questions by looking at the condition of the other bays on the coast. Now I observe that in Sinclair Bay, the north side is the deep side, and the south the shallow or sandy side. The same is true of Lybster, Latheron-wheel, Dunbeath, &c., and the sand in these inlets is all on the south side of their streams. Of the Moray Firth too, the north side is the deep side, and the south side its sandy or shallow side. The same is true of the Firths of Tay and Forth, and, is it not true of every firth and bay on the east coast of Britain? To what law is this owing? I have looked into the register of the winds kept at the harbour office here, and find that our prevailing winds are from the S.E. I have observed too that the drift sea-weed is carried to WINDWARD—may not sand and boulders under water obey the same law? Our civil engineers seem not to have recognised this law, or if they did, they expected by their works to nullify it. They have not been successful.

We have to thank you for telling us where the boulders and angular blocks came from, and the whole thing is now plain. Our river drains a valley of Till,* and our bay is its terminus. The Till in Caithness is found in deep "old-red-sandstone" gorges on each side of our bay; it is now found in high banks on the sea-

* "Till" is the name in Scotland for those coarse accumulations of mud and pebbles, with occasional blocks of stone, which have been found in the sea of the glacial period.

side, and thins off as we recede from it, and in the bottom of the bay and in the river's bed it is of great depth. The open space between the high banks of the bay and river must then have been occupied by the Till. The centre of the valley has been washed away by the sea and river, and in the boulders, forming the "North and South Odd," we have the coarser portions of the Till; the riddlings of the vast excavation. That this is the correct view will appear now clear, when I tell you that from the bridge of Wick to the Loch of Wattin there is not in our river's bed a boulder worth speaking of, while in the "Burn of Haster," which has made deep cuttings in the Till, and is a mere tributary to our river, its channel is strewn with boulders. This shows that while the large volume of our river has been strong enough to remove the *clay and boulders*, the burn has had force to remove the *CLAY ONLY*.

From the phenomena our bay presents, I think it must be inferred that Pulteneytown Harbour is in the very worst position, and that any extension of the harbour on the south side of the bay must end in disappointment to all concerned.

XIII.—*Proceedings of the Expedition for the Exploration of the Rewa River and its Tributaries, in Na Viti Levu, Fiji Islands.*

By JOHN DENIS MACDONALD, Esq., Assistant-Surgeon, of H. M. S. "Herald," Captain N. M. Denham.*

Communicated by Capt. WASHINGTON, R.N., F.R.G.S. (Hydrographer).

Read, June 22, 1857.

On Friday morning, 15th August, 1856, our little party, consisting of the Rev. Samuel Waterhouse, Wesleyan missionary; Mr. Milne, botanical collector; Joseph Dagwell, leading seaman, and myself, sailed out of Levuka harbour in the cutter, with a fair wind for Mbau.

On entering the Ndaveta levu, or large passage between Na Eau-zambu and the southern extremity of Moturiki, as it happened to be low water, we landed upon the reef projecting from the latter island, to examine a remarkable coral rock called "Ai Vaka Tangka ni Sai sai." Every part of this rock bears evidence of great antiquity. It is honey-combed, and worn by atmospheric agency and the action of the sea; burrowed by all the various perforating animals, and riven into two principal portions by a wide vertical fissure. Reference to the specimens detached from it, show that the closeness and density of its texture,

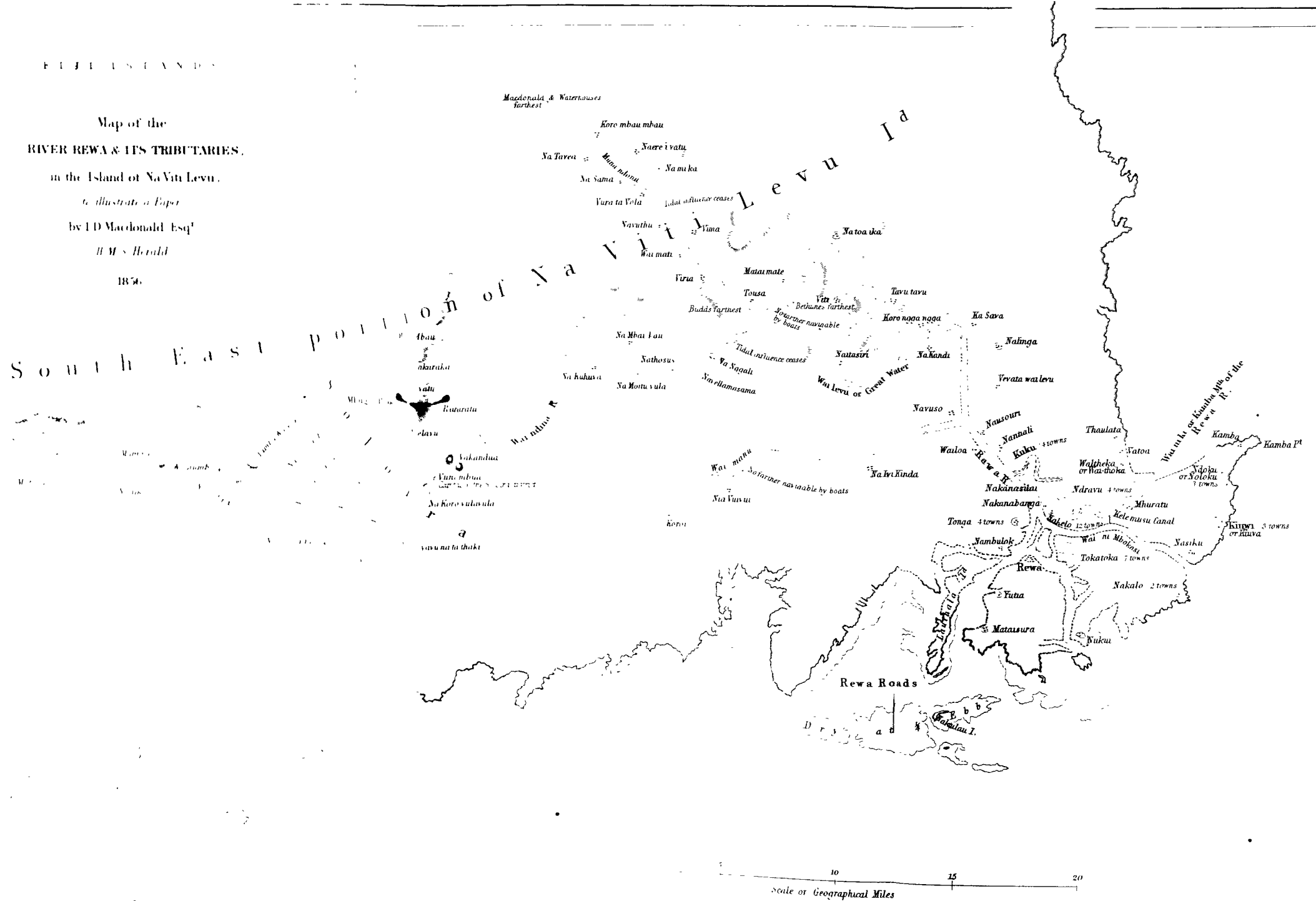
* See Capt. Worth's Paper, Nant. Mag., 1852; also Appendix, Journal of the Royal Geograph. Soc., vol. xxi.—Ed.

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Map of the
RIVER REWA & ITS TRIBUTARIES.

e illustrato a l'apert $H \models M \rightarrow H_{\text{model}}$

1835.



imparting to it a metallic resonance, is due to the solution and recrystallization of the same materials filling up the minute interstices of the coral structure, and discoloured in some parts by the admixture of the oxide of iron. It appears to be a remnant of an ancient reef, elevated above the sea level, and become the theatre of a slender vegetation, in which two stunted cocoa-nuts play the most prominent parts. There are many legends connected with this spot, some of which may be worthy of notice in passing.

The supreme Fijian deity, Ndengei, is said to have sent Lando Alewa, a goddess, and Lando-tangane, a god, to seal up the Ndaveta levu; and that, in consequence of the morning having dawned upon them in the execution of their commission, they were metamorphosed into the rock now known as "Vaka Tangka ni Sai-sai;" literally, the place of deposit for the fishing-spear. Rambeuli, a Fijian god, is supposed to have placed his sai-sai* on this spot on returning from fishing, his favourite occupation, and hence its name.

"Rambeuli" (literally the breaker of the steer-oar) is the greatest or first-born of all the gods connected with the Ndaveta levu; and when any accident happens to a canoe in this passage, he is said, figuratively, to have broken the uli or steer-oar.

The Ndaveta levu, being the entrance into the Mbau waters, was in former times held in sacred veneration by the natives, who, in passing through it, were accustomed to divest themselves of the sala, or head-dress, and seru, or comb; uttering the same shout of respect as used in coming into the presence of a chief. Offerings, usually consisting of the root of yang-gona,† were also presented, with prayers, to the presiding deity; and, having passed the Ndaveta levu, the sala and seru were again assumed.

The comb is generally removed from the head when in the presence of a chief of high rank; and even the more enlightened natives never presume to engage in prayer with the seru in the hair. It is, therefore, simply to be regarded as a national custom.

Another act of veneration is the observance of strict silence in hoisting the latha, or sail of the canoe, in the sacred passage.

We arrived at Mbau in the evening, and took up our night-quarters in the great metropolis of Fiji. Next morning we waited on the Vu-ni-Valu,‡ by whom all necessary arrangements for an early start were effected. Some of the most influential chiefs of Mbau attached themselves to our party, so that our reinforcement from Mbau consisted of Koroī Ravulo,§ Ratu Tholata,||

* Fishing spear.

† More generally known as kava-root (*Piper-methysticum*).

‡ The reigning chief of Mbau.

§ An honorary title given to warriors.

|| A title of rank.

Ratu Yako, Ratu Seru, Ratu Vea, Saudria, a man of Soso, and Jobi, a very intelligent native of Tonga.

A moderately large double canoe, and a convenient single one, with working crews, were placed at our disposal; and the Rev. Joseph Waterhouse very kindly supplied us with a small boat of light draught, with mast and sail, paddles, and poles, besides many useful things which suggested themselves to our minds after we had left the ship.

Thus provided, we started from Mbau early on the 16th, and soon entered the Wai ni Ki or Kamba mouth of the Rewa river, or Wai levu.* On passing Kamba in our canoe, Koroi Ravula, a Mbau chief of high rank, seeing his land lying idle whilst yams were being planted in other places, made the good-natured observation, that if our object were accomplished soon enough, he would engage in cultivation; but, if not, that he would not forsake us on that account.

Stretching from Koroi Ravulo's ground at Kamba, for some distance into the mouth of the river, a strip of land, with its Vesi trees and other rich foilage, is held sacred by the natives. No trees are allowed to be cut down, lest the anger of the gods should be involved. Just above this sacred region a large number of canoes were drawn up on a sloping beach, amongst the mangrove trees, having brought down husbandmen from "Mhuretu," situated farther up the river, to plant yams for their neighbours according to Fijian custom.

On the left hand side of the river, the natives pointed out to us a small canal, leading through the mangrove bushes, which is held so sacred that every one passes through it in silence, it being tambu even to touch the overhanging boughs of the trees. The presiding deity of this canal is reputed to possess a lali (drum) so large as to require eight persons to beat it. He is known by the name of Mburerua, and when his lali is heard, it is considered as an indication from heaven that all the neighbouring tribes will be involved in war. The present Mbau chief is known to have propitiated this deity with turtle and large pigs, &c., in troublous times.

A small portion of the mangrove-beach on the right-hand bank, bounded by two small creeks, and pointed out to us as the residence of a foolish god, who once ordered the Mbau canoes to bring him food on one side of the river, and those of Rewa on the other. But this order was repelled, although both parties entertained a certain amount of respect for him. Another god, on the opposite side of the river, usually amused himself by making sarcastic comments on the people passing by in their canoes.

* Wai, water; levu, great.

Koroi Ravulo lately cut down a large vesi-tree at Mhuretu, to make an upright, or post, for a new chapel. It was formerly held so sacred, that when a native came near it he always made a circuit round it to continue his course; the tree was held sacred to Mbururua. All the gods, from Mhuretu to Kamba, were very greatly feared by the natives.

We visited a very handsome and commodious Mbure,* 45 feet high, 30 feet long, and 20 feet wide. The uprights consisted of trunks of trees from 4 to 6 feet in circumference. The walls were made of reeds, tastefully sewn together with fine sinnet.† The horizontal rafters were covered with reeds nicely wrapped round with sinnet, and alternately weaved over with black and white sinnet in most graceful and varied patterns.

We next passed the Kele Musu, or canal, cut by the natives to join the Wai ni Mbokasi, and avoid the inland circuitous course of the Wai ni Ri, so as to save distance in opening into the Wai levu, or main trunk of the Rewa River. We entered the latter then by the Wai ni Mbokasi, and reached Navuso at the close of a hard day's toil, poling and skulling as the depth of water varied.

This town is situated just within the mouth of Wai Manu, and at a distance of about 12 miles from Mataisuva. It is the present residence of the chief of the Naitasiri district, who received us most warmly, and promised to afford us all the assistance in his power in the prosecution of our journey. The Vu-ni-Valu's message was communicated to him by Koroi Ravulo, chiefly to the effect, that trustworthy persons should be appointed by him to accompany us, and secure the friendly co-operation of the inland chiefs under his authority.

Koroi Ravulo's prologue was delivered in a very eloquent manner, and, towards its conclusion, two large whales' teeth were laid before the chief, with other presents which we selected for him. Thanks were returned by the chief, "*Ko mai Naitasiri*" himself, in Fijian style, with a storm of acclamation and clapping of hands on the part of a large assembly of courtiers and friends.

We ascertained that a small canoe had arrived before us, and had given notice of our coming, so that a pig was killed for all hands, and hot yams and taro, with vakalolo‡ and other Fijian food, were now brought on in native trays by female attendants, uttering the "*tama*," or shout of respect, in a crouched attitude. A large fresh-water bivalve, a species of *Cyrena*, was served up in earthen bowls. The soup made from them is very savoury, but the fleshy part of the foot is rather tough. A small *modiola*,

* Sacred temple.

† Cordage made from the cocoa-nut husk.

‡ Vakalolo, native pudding.

occurring in the salt and brackish water, was also cooked in large quantities. The latter is said to have been formerly in more general use as food than the cyrenæ.

We took a note of the chief's report of the existence of thermal springs in the neighbourhood of Soloira, and obtained many other useful scraps of information to guide our researches.

Monday, 17th.—We set out from Navuso with the chief, Ko mai Naitasiri, who, in the handsomest manner, volunteered to escort us. He had previously arranged to attend a "Solevu" (Fijian assembly), but very kindly said that he would forego a more important matter to accompany us, and give us the advantage of his influence. As we proceeded, wild ducks were to be seen in flocks on every low part of land or sand-bank. The natives distinguish two kinds, viz. Nga ndamu (red), and Nga loa (black). The former is a wilder species than the latter, and not so frequently met with. It stands up, with its head erect, and utters a peculiar sharp cry in flight. Dagwell knocked down six of the Nga loa in two shots; but the others were too shy, and took wing before the necessary approach could be made.

Another accession was made to our party in the person of Ratu Vakaruru (the nephew of our old chief, Ko mai Naitasiri), whom we met on our way, lying down like a gentleman in a small canoe, poled along by two men. He wore a large boar's tooth suspended round his neck by a broad necklace of white beads, and a piece of blue figured sulu round his loins. Ratu Vakaruru struck me as one of the finest Fijians I had ever seen; and I am satisfied that if his likeness could be accurately taken, it would form quite a contrast to the ill representations of those islanders extant.

The banks of the river here exhibit a richly ferruginous sandy basis, with a fine alluvial surface 4 to 5 feet in depth. The river runs at first nearly due north from Navuso to Ka Savu, a distance of about 3 m., and then winds suddenly to the westward, Mbau lying to the N.E. The banks on the right hand then passed rather abruptly into rude hilly country. Continuing our course, from Navuso we noticed a few beautiful *Nin sawa* trees (a species of areca, growing on the point opposite. Nakandi, and every reach onward from this, exhibited more loveliness and picturesque effect. The fresh water is said to be infested with sharks similar to those occurring at Rewa, and consequently in the brackish or salt water. These so-called sharks—from the examination of some heads very nicely prepared by the natives, and the description of these animals given by them—I am inclined to think belong to the skates and rays: and there is every reason to believe that they are peculiar to the fresh water. The natives affirm this; but it will be necessary to procure some specimens before this question can be set at rest. Ko mai Naitasiri told us the case of some men who went up

the river a considerable distance to cut some spars for a heathen temple. On the way back one of them jumped overboard, and instantly a shark snapped off the greater part of one of his feet. Another man sprang to the rescue of his friend, but almost immediately one of his hands was bitten off; and three more persons were bitten, one after another, in the struggle. The man who lost his hand is said to have died soon after from loss of blood, but all the others ultimately recovered.

The sharks are said never to attack the Mbau people when they enter the river; so that it was not unusual in former times to hear those favoured individuals exclaim, Mai Kumbuna, "I am from Kumbuna," one of the names of Mbau.

Naitasiri opened when we rounded a richly-wooded point of the river, called Wai ni Kumi—literally, "Water of the beard." A superstition, connected with it, exists amongst the people, that beardless boys may expedite the growth of their beard by bathing the chin in the water dripping from the rocks. The latter were of a sedimentary formation, presenting a nearly vertical face, over which a small stream of water was rushing down. This stream might possibly be much augmented after heavy rains, but it is the only approach to a waterfall occurring in the district.

As an instance of the great number of Cyrenæ in the river, I may mention, that Ratu Yako, a young Mbau chief who formed one of our party, jumped overboard while the canoe was poling along two or three knots, and picked up several specimens.

The tributary stream Wai manu, opening into the Wai levu at Navuso, courses in an easterly direction from the neighbourhood of Namosi through a very populous district; but the large river, from Navuso to Naitasiri, is very scantily populated. Very few cocoa-nut trees are to be seen, although their importance and value are well known to the people. This is attributable, however, to the continued warfare of former times: when a town was besieged the resources of the people, including bread-fruit and cocoa-nut trees, were cut off by the enemy.

Rich foliage, embowered with creeping plants, beauteous tree-ferns, and Nin sawa trees, everywhere met the eye. All the intervening spaces, but more especially the immediate banks of the river, are covered with tall grass and humbler herbage. The river gradually closes from Wai ni Kumi towards Naitasiri, but widens out again at the latter place, the left bank in particular rising to a considerable height.

On arriving at Naitasiri we secured our canoes and ascended a high grass-grown bank, following a beaten path leading through a grove of shaddočk trees, the perfume of whose blossoms loaded the air. It was arranged that we should put up at the house of the

The Mbure ni Sa was about 50 feet long by 21 wide, with a beautiful spar of the Mako sui tree as a main rafter. Sleeping places, furnished with mats, spread upon a soft layer of ferns and small grass, were arranged along each side. The young men of the town usually sleep in this building, but they are always ready to give up the berth to strangers—a comfort arising from native hospitality which is best appreciated by those who have experienced its advantages. A small creek on the right bank, near the above mentioned town, leads some little distance into the country. The left bank above this creek is said to suffer little from the floods which are known to produce such remarkable effects in other parts.

The town of Natoaika was lately attacked and destroyed by some of the Naitasiri tribes; but it is now being rebuilt. The Cyrenæ in this part of the river are very large, and of a superior flavour, so that presents of them are sent to Mbau frequently. Large piles of the shells are to be seen near every house, and, from the accumulation of years, they form no small portion of the superficial deposits round the town. The ndawa fruit abounds in this district. This place was formerly well populated, but the people were decreased by the disease called lila, already alluded to, which broke out as an epidemic among them. The chief, who was at that time a young man, daily occupied himself in visiting the towns, and removing the dead bodies, which were immediately cast into the river. As this was generally performed by fastening a cord round the neck and slinging the body into the water, many moribund cases were strangled before their last rites were performed.

The rains are sometimes so heavy as to fill and sink canoes in the river, defying all efforts of the natives to bale the water out.

On leaving Viti we saw a woman coming along with a great load of fire-wood on her back. The chief called her near us, as we were anxious to try its weight, which was estimated at about 80 pounds. She exhibited the greatest anxiety and fear when I approached to present to her a stick of tobacco.

The country is now more elevated, and little streams trickling down from a high source begin to make their appearance. Stratified rocks occur here and there. Mr. Waterhouse shot a duck on a remarkable quay of this formation, lying towards the right bank of the river. From this our course took a south-westerly direction.

On approaching Matai Mati, a great number of people showed themselves on the banks of the river, the men all armed with clubs and spears, shouting in the wildest manner; and but for the presence of the women and children, which is always a friendly indication, a very formidable appearance would have been presented to the minds of those unacquainted with the Fijian character.

We climbed up a steep, slippery bank—composed of reddish brown clay—to the town of Matai Mati. Ko mai Naitasiri went before us to the Mbure, where we sat down while arrangements were being made to communicate with the chief of the place, in order that he might meet us at the branching of the Wai levu river into the Muna ndonu and Wai ndina, where we were to take up our quarters for the night.

Having settled this matter satisfactorily, we made a rapid survey of the town, and returned to our canoes.

The left bank is here very precipitous, with stratified rock peering here and there through rich vegetation.

Having reached the town of Tau-sa just within the Muna ndonu, we seated ourselves on a large lali in the strangers' Mbure, and waited the arrival of the chief of Viria, for whom we had despatched a messenger from Matai Mati. The Mbure ni Sa is a low, but rather long, building, fitted up in the usual way, with its alternate fire, and sleeping berths, arranged on each side. Two curved sticks, or stout creepers, supported a bundle of firewood over each fire-place. We were much amused to find the carapace of swimming crabs and other relics of the salt water, so highly prized as to be placed in the thatch, for the purpose of ornament. We observed the heads of fresh-water fish, very nicely cleaned, set on little sticks and stuck in the thatch in the same way. Amongst other things we selected several of the so-called sharks' heads, which we were anxious to obtain for examination. They were beautifully prepared though very much smoked and covered with dirt.

The natives were now making their appearance one by one, and venturing nearer by degrees to see the Papalangis.* A large root of yanggona was now presented to our chief, and received Vaka Viti,† with the acknowledgment of thanks, the chief addressing the messenger in somewhat these words: "I lay my hand on this root of yanggona, desiring that peace may reign in Viti,‡ and that the gospel may spread through the land." The people simultaneously exclaimed, "E mana ndiua, ndiua," which is an approving affirmative, equivalent to our "Amen," or "So be it."

After this all the adults of the town assembled to welcome the visitors, clapping their hands and exclaiming "Sa mata vinaka mai na turanga," or, "Welcome to the chief who comes on a peaceful errand!" The chief now stated who we were, and the object of our mission, giving a detailed account of our proceedings up to that time, while a fogleman interlarded the more impressive parts with "Io Sakwa" (Yes, sir); "Sa vinakwa Sakwa" (Good, sir). The speech consisted of a series of pithy sentences, or bursts

* Papalangi, a foreigner.

† Vaka-Viti, Fiji fashion.

‡ Viti, Fiji.

of eloquence; commencing with a pathetically drawn out hesitation, and ending rather abruptly, in a louder tone of voice—climax being the figure most generally preferred. The chief of Viria made his appearance in the evening, when all these ceremonies were repeated.

He was very dark, muscular, and well made, and much superior to many of his people. His dress consisted solely of a narrow strip of masi, arranged in the T bandage fashion, and ending in a bow and tail-piece behind.

Tea and biscuit were served out among the chiefs, who expressed their satisfaction by the repeated comparison of their own mode of living, with the comforts of civilized life, enjoyed by the Papalangis. Pipes and tobacco were in the highest estimation; but as we had brought but a small stock from Naitasiri we were obliged to be a little economical.

As the evening passed on, I constructed a rude flute of bamboo, to the music of which Mr. Milne figured away in the sword dance and Highland fling (thermometer 86°), enshrouded in ample folds of native cloth, under the flattering hallucination that he had once more assumed the plaid. Two pieces of sugar-cane, crossed on the floor, supplied the place of broad-swords. The remarkable agility exhibited in the dance created great astonishment amongst the natives, while the heat of its execution had acted most potently on the vessels of the performer's skin. Then followed a series of gymnastic feats, which largely called forth the faculty of imitation on the part of the more youthful members of the community.

The festivities of the night being ended, all our traps were collected together in charge of some of the party, who slept near them, while others selected snug berths for themselves in the corners and different parts of the house. The sleeping-places were well covered with matting, and warmed by small fires on either side. Many of the taukeis or residents slept in the Mbure with us; so that, with our own party, fifty persons must have been accommodated.

Thursday, 21st August.—It rained very heavily at intervals throughout the night, and continued so the next morning; but, as there was some little chance of a clear-up in the weather, we determined to resume our course for Soloira. The chief provided us with a pig for our journey, and parties of natives attended us. On firing one of our revolving pistols, great shouts of surprise were raised.

We now proceeded up the left bank of the river, with the addition to our party of a messenger from the chief of Viria to the chief of Soloira, Ko mai Vuni Mbua.

On the right bank we visited a small turmeric manufactory, in which a party of women were busily employed. The receiving-pits, which are dug in the ground, are lined with fine grass and

banana leaves, so as to retain the juicy parts. The grated root is afterwards placed in the body of a canoe, and raked up and strained through a fine basket lined with fern leaves. It is now conveyed away in bamboos and exposed to the weather for several days, when the supernatant fluid is removed from the sediment at the bottom. This is used as food, but more commonly to daub over the bodies of women after childbirth, and those of dead friends, and widows immediately before strangulation. Turmeric is said to be very plentiful here, and much valued elsewhere.

The river was swollen considerably after the late rains, and the effect of large floods is apparent in the frequent occurrence of snags and drift-wood entangled in the branches of the trees on the banks.

The banks of this river are said to be the theatre of many fierce battles in which the Naitasiri tribes were involved, and so much human blood has been poured into the stream, that the natives call it "the river of blood." In passing along, the chief pointed out the situation of several towns which had been destroyed in these encounters in past years, and connected with which, every one is ready to tell some revolting tale. The country along the banks of this branch was formerly well populated, but it has been much reduced by war; the right branch, however, is still very populous, where its baneful influence has not been so severely felt.

The force of the rapids frequently checked our speed, and the river-bed being continually subject to change by the action of the floods, the position of the channel was rendered exceedingly uncertain. The river also was very tortuous, though trending mainly to the westward, and shallows often extended quite across its course so as to prevent the possibility of navigation when the waters are low.

After a more or less serpentine course for some distance, the river suddenly turned to the southward, and when we got into position, with a bamboo forest on rising land, bearing E., the Mbuggi levu range became visible, bearing W. After this, as we proceeded, the mountains bore W. by S., W., and W. by N. successively.

Having reached a part of the river, with a broad pebbly beach on the right hand, we determined to bivouac there, as night was approaching, and we found it impossible to gain Soloirā before dark. Fortunately for us, a turmeric establishment, made of bamboo and roofed in with wild banana leaves, had been constructed on the spot the day before. We saw a party of natives on the opposite side of the river, and hailed them to bring us some yams and firewood. Butchers' knives procured these things, with a small pig which was killed for our working party.

Although we had experienced such heavy rain, the flood resulting proved most fortunate for our expedition, as we were enabled to

take our large canoe a little further; but, in consequence of the rapid fall of the waters,* great difficulty was repeatedly experienced next day poling our craft along. The young men in the small boat displayed the greatest agility in towing it along the shore with a rope, and often swimming against the flood or across the deep parts of the stream to regain their footing.

When we had proceeded about ten miles in a westerly direction, the river took a southerly sweep. The flood was coming down with great force, widening its way by undermining the sides of the banks. A great mass of the right bank fell in just as we passed the spot, and we now and then observed trees rolling over and over borne down with the body of water. In other places massive trees were torn up by the roots and lying prostrate in the stream. The banks of the river here are composed of a basis of small rounded stones and pebbles, filled in with grit and sand, and overlaid with comparatively recent alluvial deposits resembling those already alluded to.

About half a mile from this spot and on the right bank of the river we noticed a small soro,† to propitiate the gods presiding over the fish of the stream, placed in front of a tree, whose intricately-woven roots were laid bare by the undermining force of the floods. The soro consisted of makita leaves, forming a little cone, with a cross piece on top of wood. On the left bank, a little further on, we saw two other soros, consisting of bamboo fishing-baskets, answering the same purpose.

We next came to a very large mbaka tree, with a clear earthy bank at its base, where sat Vere Malumu, brother to the Soloira chief. Several men were engaged in constructing a lovo‡ and preparing yanggona. We went on shore to pay a friendly visit, and were very warmly received by the natives. Our old friend Ko mai Naitasiri introduced us to the chief with much formality, as "Mbete ni lotu" (Christian minister), and "Turanga ni Manawa" (gentlemen of the man-of-war). When the ceremony was at an end, the distribution of pipes and tobacco placed us on a more easy footing.

Mr. Waterhouse and I went up a rather slippery path to the top of the nearest high land, from which we saw Mbuggi levu, about three miles distant, bearing w.n.w., and a range of mountains, called Lutu, was pointed out to us, bearing n.n.e., and appearing to be about 30 miles off, as the source of the river called Wai ni Mbuka, which opens into the Uluna ndonu. The latter river flows through the heart of the country, arising in a n.n.w. direction.

* We noticed by the position of the canoe, and the water-mark on a post, that the flood had abated four feet during the night.

† Soro, an atonement or propitiatory offering.

‡ A native earth-oven.

On searching amongst the dead leaves in the forest, we noticed a species of *Truncatella* and two other species of inoperculate *Diplommatinæ*. One of them was minute and dextral, corresponding to that found at the island of Vatoa; but the others were sinistral and of much larger size. There was a distinct tooth on the columellar lip in some cases, but I could not detect an operculum. We obtained also the little *Bulimus Tuckeri*, and the generally distributed *Plekocheilus* and larger *Helices*.

The vegetation was more beautiful than anything I could have conceived. We noticed a particularly remarkable species of *Flagelaria*, with a stem of about 4 inches in circumference, scaling the tallest trees by means of its prehensile leaves.

Having left this place, we proceeded up the river to Vakaudua, a rather small but well-inhabited town, most beautifully situated on elevated land, and surrounded with the river and forest scenery. We were received with the usual pomp, and the chief's speech over the root of *yanggona* was delivered with his accustomed gravity and chief-like bearing. The *lalis*, or drums, were beaten, at first to acknowledge the gift of an axe to the chief, and again in honour of our visit.

The evening was in part occupied with dancing and gymnastics on our part to amuse the natives, whose yells at every commonplace thing showed how little they had ever communicated with the Papalangis.

On the following morning, after breakfast, we resumed our journey, occasionally encountering a heavy shower of rain, and, after having passed several difficult parts, and through numerous windings of the river, we arrived at the mouth of a tributary stream on the right hand, said to wind in a northerly direction to the base of *Mbuggi levu*, and round along the eastern side of the range. We continued our course, however, up the main river, and ultimately reached the province of the Soloira tribe, ruled by *Roko Tui Wai Maro*, or *Ko Mai Vu ni Mbua*, whose friendship was of the greatest importance to us. Our next difficulty was to ascend a very steep and slippery path, leading up a mountain spur, to the town of *Vuni Mbua*, the capital of the Soloira district, and the residence of its chief. The earth was so moist after the late rains, that we were obliged to use long "*titokos*," or walking sticks, to preserve our footing. The natives here, but more especially the women, who are much ill-used, and employed as beasts of burden, carry a *titoko* with them whenever they go on a journey.

When we gained the elevation, which seemed about a mile from the river, where we left the canoe and small boat, long bamboos of fresh water were brought out to wash our feet. Then followed the introduction, the presentation of *yanggona* and food, with the

appropriate speechifying on both sides. When all this had been formally gone through, we took up our place in the Mbure ni Sa, which is a long and singular looking building, formed as it were of two pent-houses joined together, with an old canoe placed at the junction of the two roofs, as a gutter to carry off the rains. The internal arrangements were similar to those of the other Mbures we had already occupied. The lalis were hauled out through the low doorway, and the tum tum began to honour our arrival, and to acknowledge the presentation of two whale's teeth and a few axes and knives to the chief.

Taking advantage of a dry interval to see the country, we ascended a hill near the town, which is about two miles from Mbuggi levu. This mountain bore N.W. by W., and the island of Ovalau was visible in the distance, the N.W. conical peak bearing N.E. The position of Namosi was pointed out to us, behind some remarkable looking peaks in a W. by S. direction. From this point of view Mendrau-suthu—na-Mbasauga* were concealed by Mbuggi levu.

This elevation commands a very charming prospect of the surrounding country, more especially the mountain scenery. Mbuggi levu rears its lofty head to the left, with many peaked and rugged mountain masses in the immediate vicinity. The winding bed of the river diversifies the hilly region, through which it passes in the centre, and very distant mountains peer up, one behind the other, passing off, by aerial perspective, into the tints of the sky on the right. On looking upon the scope, through which the floods roll at certain periods of the year, and the comparatively small portion of it now traversed by the river, it may be easily conceived how the course of the latter, within certain boundaries, may vary with the casualties resulting from the action of the floods breaking down existing banks and filling up the previously open channels.

While ascending the river, we frequently observed that one bank rose more or less suddenly to a considerable height, while the other was comparatively low, extending into a sward of tall grass almost devoid of trees, and these characteristics changed from side to side, apparently in the most fitful manner; but the problem was at once solved by the bird's-eye view of the district, commanded from the heights of Soloirā.

The reward of a butcher's knife having been offered for the cones of the Dammaras in the neighbourhood, a native set off and returned very quickly with the prize. The people affirm that there are two kinds of Ndakua Ndina,† distinguished by the

* A part of the serrated Mbuggi-levu range, bearing resemblance to the female breasts, and supposed to have yielded nourishment to a twin deity connected after the manner of the Siamese twins.

† The native name of the Dammarā.

names of Ndakua leka (short) and Ndakua mbalavu (long). The former is said to be stunted in its growth, while the latter is remarkably tall, but they appear to imagine that the difference results from circumstances of position, exposure, nature of the soil, &c.

Mr. Milne brought in a fine collection of plants, after a heavy tramp over the hills through drizzling rain, titoko in hand. He succeeded in obtaining a specimen of a new coniferous plant, named Kau Solo by the natives, who class it with the Ndkua-Salu-Salu, which is identical with the *Dacrydium cupressinum* of New Zealand. Amongst other things I noticed a white *Erythrina*, agreeing in every particular, save colour, with the *Erythrina Indica*.

The ferns were exceedingly rich and numerous, including doubtless many new species, if not new genera.

We obtained three different species of inoperculate *Diplomatinae*, a *Truncatella*, a large *Helicina*, a minute *Egea*, and several *Helices*, in the forest, on the mountain side near the town.

While at Soloira, the chief dealt with us in the handsomest manner, and food was prepared for us on a very liberal scale. Our papalangi store, however, falling a little short, we found it necessary to despatch a messenger to Naitasiri, our last *dépôt*, for a fresh supply. While directions were being given to a rather stupid, though willing native, our young Mbau friend, Katu Yako, volunteered, in the most spirited manner possible, to execute the journey himself.

Whilst seated on a grassy bank, in the cool of the evening, we found ourselves surrounded by a great number of natives, who made very particular inquiries respecting Her Most Gracious Majesty. When we told them of the anthem in which we implored Heaven's blessing to rest upon our Queen, they expressed a strong desire to hear it. We at length yielded to their entreaties, and, amidst great applause, sang "God save the Queen."

We found that the custom of strangling widows prevailed in the district of Soloira. In conversing with the chief upon the subject, he at first denied, but afterwards admitted it. He listened favourably, however, while Mr. Waterhouse advised him to abandon this evil practice. In many districts through which we passed, we found that the practice of sorcery was prevalent. When one individual wishes to effect the destruction of another, he applies to the sorcerer, who immediately exerts himself to procure some scraps of food left by the doomed victim, or portions of his dress. These are then placed in contact with certain leaves, and the result of that contact is said to be the death of the individual whose life is sought. The natives generally place great confidence

in these acts of sorcery, which are called "Vaka Ndrau ni Kau taka" (literally, to accomplish with leaves), and the master of the art becomes an object of much dread, and generally commands great respect and attention in those towns to which his fame has preceded him. In some instances, where anything, as yanggona for instance, has been taken from a plantation, and the thief is unknown, this custom is resorted to in order to discover and punish the transgressor. A portion of the yanggona left in the plantation will be placed in communication with the fatal leaves, and the result will be the death of the offender. An instance was stated by one of our party which had come under his own observation. Two men had stolen yanggona. The "Vakadraunikautaka" was practised, and as soon as the fact became public, two individuals were seized with illness which proved fatal, and before dying they confessed that they were the thieves. There was no indication of disease in their case, and the narrator was inclined to the opinion that their death was the result of their nervous and superstitious fears.

On the morning of the 28th, after breakfast, we set out from Soloira in small canoes, each carrying about three persons, with the little boat containing our provisions, &c. The large canoe was hauled up out of the influence of the floods and properly secured. On reaching the next town, about 4 miles further up the river, we made fast our little boat to await our return, as it would be impossible to take it any further on, on account of the shallowness of the water in some places, and the force of the current in others. We were soon safely housed in the Mbure ni Sa of Nondo yavu na ta thaki. It was by far more comfortable than any in which we had taken up our abode hitherto. The building was spacious and well supplied with all the native requisites for such a place. Moreover, the display of natives was not so formidable as to numbers. The people were represented by two elders, one of whom had been a great man-slayer in his time, and both asked many questions about the lotu; but they said that Ko mai Vuni Mbua must take the lead, before they could embrace Christianity.

We noticed one or two very remarkable little objects placed outside the mbure, consisting of rounded stones, coloured yellow with turmeric, and elevated upon short stumps of fern-trees. We thought at first that they were shrines of some deity, and our chief, under this impression, placed his foot indignantly upon one of them, without however injuring it. We found out afterwards that pigs were tambued,* and these stones were erected to warn strangers that pigs could not be obtained while the tambu was in

* Tambu—sacred, a prohibition.

force. This reminded me of a tambu on mats, observed at the town of Viti during our visit, consisting of some of the materials of which the mats are made, elevated on a pole and crowned with a large shell of *Triton tritonis*. I could not help reflecting that the tambus on cocoa nuts, which we saw at the Isle of Pines, were of a very similar character.

In this district, where cocoa-nut oil is not to be obtained, the gum of the Damurara (*Makandre*), which exudes in large quantities from the trees, is made up in the form of pastiles about 2 inches in length, and these are burnt one after the other, so as to keep up a continual light. Another more civilized mode of burning the *Makandre* is to surround a slip of wood with ribbon-like strips, so as to form a rude sort of candle. It is usual also to wrap the gum up in leaves, and bind it round with a rush or some such thing, and use it as a torch in passing from place to place by night. When burnt, as in the first instance, deep earthen basins protect the ignited gum from running about, and thus setting fire to the dry matting, which would rapidly demolish the house. We now discovered the use of a large conical stone with a hollow top, which we noticed in the Mbure ni Sa at Soloira. Not having seen the gum burnt upon it while there, it was rather problematical. The gum (*Ndrenga*) of the bread-fruit tree is very different from that of the *Dammara*, both in character and the uses to which it is applied. As it flows from the wound it is thin and limpid, but when received in a vessel placed beneath, it soon separates, like blood, into a more solid portion, which sinks to the bottom of the vessel, and a supernatant fluid. The latter is thrown away, and the deposit is placed in cold water to consolidate it more rapidly. Rounded masses of this substance are preserved for use, but it requires still further preparation before it can be applied as a luting or cement. Thus, it is worked up with the hands for some time at a certain degree of heat, when it becomes exceedingly pliant, and so adhesive as to stick to the fingers with the greatest tenacity, and interfere with any further manipulation. But this is prevented by anointing the hands with an oily juice extracted from the cocoa-nuts.

Nondo yavu na ta Thaki occupies the site of a once populous town, whose inhabitants are now extinct. We cannot procure any information on the spot as to the cause of their extermination. They were famous for cutting spears, and are reported to have been in the habit of taking down their mbures and houses in the morning when they went to work, and erecting them on their return in the evening. It is said that the chiefs of the coast used to oppress them so much, by burning down their houses as fast as they built them, that they were denominated the "people whose occupation it was to cut the timbers for houses." The present

inhabitants fled from a district near the coast in consequence of war, and reached this place, where they found the ruins of houses which had been built on a very large scale.

From all the inquiry Mr. Waterhouse made, it appears that the sole deities of these people are the spirits of their forefathers. In other parts of the Fiji Islands, besides the worship of the spirits of the dead, the existence of other gods, more strictly deserving the name, is believed. In the coast districts especially, the "Kalou vovus," or gods without a birth, are alone venerated. The inland tribes of Na Viti levu do not worship, though they accredit, the deity Ndengei; and they affirm that the knowledge of him has been derived from Ra or Raggi-raggi, situated to the westward—a fact which, in the opinion of Mr. Waterhouse, goes far to prove that this has been the storehouse of the Fijian race, or that the natives of other parts have been immigrants, who received their information from an earlier stock. To Raggi-raggi is also attributed the knowledge of the nature and use of fire, as well as the mode of its production by the friction of pieces of wood. Uncooked food was at first deemed unpalatable, but one of the sons of Ndengei having rubbed two pieces of wood together produced fire, by which he cooked his food; and thus its advantages became known. The Tongese have a tradition of a similar nature (as noted by Miss Farmer).

Some places boast of prophets or seers, whose express calling is to foretell future events: they are quite distinct from the priesthood. One of these old characters sat by us in the mbure at Vuni Mbua, and was very warmly taken by the hand by our chief, with a patronizing Sa laloma—(my love to you).

29th.—We took leave of our friends at the town of Nondo Yavu na ta Thaki, and having passed through about 10 miles of the river, winding through the most charming mountain country, with occasional rapids and shallows, we arrived at the town of Na Seivau, famous for its hot springs. One of these was bubbling from the summit of an irregular mass of rock, apparently a portion of an ancient dike near the landing-place. The temperature of the water in this case was about 106° , and, collecting in a wide recess in the rock below, it formed a very delightful natural bath. At some little distance further on we visited another spring, with a temperature of 140° . Here also the water was gushing out from the summit of a very remarkable mass of rock, but the latter was very distinctly composed of a metamorphic breccia, presenting a beautifully variegated surface. The natives state that the water occasionally emits a disagreeable odour; but this was not very apparent to us at the time of our visit.

Na Seivau was destroyed some time back by the Namasi people. It was once famous for its cocoa-nuts; but these, with the bread-

fruit and other useful trees, were destroyed by the enemy, as is usually the custom in Fiji. This tribe was constantly at war with Namosi, and the well-picked bones of those of the latter people who fell, were suspended on the trees round the town; but the Namosi people stormed the place at a lucky crisis, killed a great number of the inhabitants, and took away the bones of their friends for burial. In the interior districts neither bread-fruit nor coconuts are to be found; and, it is said, not on account of the indolence of the people, but of their almost total ignorance of the use of these things. There is, moreover, but one, and a rather inferior kind, of Ndalo * cultivated; and yams † are not planted in such large quantities as on the coast.

As an example of the character of Fijian warfare, the following case may be cited:—About two months ago Kuro Nduandua, the Namosi chief, assembled his forces to attack a rebellious town. He sought and obtained the alliance of the Soloira people. The allied army attacked the town, but none came within range of musket-shot but the “Invulnerables” of Soloira. These latter advanced boldly to the front until one of their numbers was shot through the head, and then the whole army, consisting of thousands, ignobly fled.

The “Invulnerables” (Vaka thuru Kalou Vatu) are certain persons not necessarily connected with the priesthood, who, in the superstitious belief that they are inspired by their deities, and rendered spear and shot proof through their protecting influence, and, thus buoyed up, are known to perform acts of the greatest daring which generally effect a conquest. Before fire-arms were introduced into Fiji, these men were famous for their indomitable courage; but the skilful use of the musket has damped their ardour of late.

A remarkable instance of the many lessons read to superstition by this means occurred at Kasavu. When the Invulnerables headed the assaulting party, a ball passed through the large fan used on these occasions, entered the brain of the first Invulnerable, and seven more were successively shot dead in the attempt. The chiefs were so enraged at this, that they determined to club the priest for having so deluded the people, but he escaped their vengeance by flight.

The tubers of the Kaili, a kind of wa or creeping plant, is used by the people of Seivau as an article of food. They are first boiled, peeled, scraped, mashed up, steeped in the water and boiled again, for the table. They are said to possess a bitter and probably poisonous principle in their natural state, and require to undergo the above process in order to remove it.

* Ndalo, the Fijian name for taro.

† Uvi is the native name for yams.

From Na Seivau we continued our course as far as it was possible to perform it by water. We found the river filled with large boulders, over and between which the water was rushing with incredible force, so that all our little canoes were necessarily hauled up on land, and the traps and moveables distributed amongst our party, and, having got into marching order, we wended our way, first, through a deep mountain-gorge of the most picturesque character, but afterwards through more open country, repeatedly crossing the stream, descending and climbing occasionally very precipitate banks.

We met a lad who essayed to be our guide, having been sent by a white man named Harry (with whose reputation we were previously acquainted), to say that he had come down from Namosi to meet us at the town of Wai nu Mbi. When we arrived at the Mbure ni Sa of this town we saw the celebrated Harry, who, from his long intercourse with savage life, was evidently much embarrassed at seeing white faces once more. He was a small, thin, spare man, apparently in very ill health from the absence of those comforts which an Englishman's constitution demands. He wore a long beard, Fiji fashion, and, until very lately, when he was enabled to obtain some clothing, he was obliged to adopt the masi, or native cloth. He gave us a rapid sketch of his eventful history, his apprenticeship to the sea, disagreements with employers, colonial experience at Melbourne, trading amongst the South Sea Islands, and, last of all, his residence in the mountains of Viti levu, amongst a far-famed cannibal tribe of Fijians.

Harry led the way to Namasi, which we reached towards evening. It lies on the right bank of the Wai Ndina, in the luxuriant valley of Ono Mbaleanga, which trends nearly East and West, between rugged and lofty mountains. The sublimity of the scenery cannot be faithfully described, though some idea of it may be gathered from the accompanying views, very skilfully painted by Mr. J. Glen Wilson, from some of my sketches taken on the spot.

We put up in a small mbure on the opposite side of the river, where we waited while the chiefs and people were assembling in another building to greet our arrival and receive our presents. Our chief was received with great pomp and respect, although but a short time ago the most inimical feeling existed between the parties.

In the rara, in front of the town Namasi, we observed two rows of small stones nicely let into the ground as a sort of register of the number of Mbokolas from time to time brought to the town. A chief, or person of rank, was indicated by a stone somewhat larger than the rest. It is customary to offer part of each body

to the spirits of the dead, and this part is not eaten. We also observed a considerable number of human bones, grown over with mosses and ferns, hanging in the boughs of large trees in the *rara*.

In the outskirts of the town there is a large and remarkable mass of conglomerate rock, upon the summit of which the remains of the last king were laid. A handsome *mbure* was built over them, and offerings of human food are still presented to the spirit of the deceased whenever the opportunity presents itself.

A few days ago a large canoe from Navua went out on its first voyage, when a fleet of the enemy from Serua attacked it, and succeeded in killing one man, who fell overboard. The Serua people now dispersed, and the canoe, on returning, landed a detachment with directions to surprise the enemy on coming ashore. They fell in with a party of seven, four of whom were killed, two fled, and one was taken prisoner. The latter was almost immediately boiled alive in a large cauldron. Koro Ndua-ndua, the perpetrator of this cruelty, addressed him, in short terms, to the effect that, as he had so wickedly cut to pieces a living man of his (Koro Ndua-ndua's) people, he should be served as the case deserved. The unfortunate man was then thrust headforemost into the boiling pot. The greater part of the slain were eaten at Navua, but parcels of the revolting food were distributed amongst the chief's dominions in the mountains.

On the morning of the 30th, after a little parley with the chief, Na Ulu Matua, the knee of a *mbokola* (dead body), already cooked, was brought to our *mbure*. The bones had been removed by an incision made on one side, and the whole was carefully wrapped up in banana-leaves, so as to be warmed up each day in order to preserve it. Of six parcels of human flesh which we knew to have been sent to Namasi, this was all we had an opportunity of seeing. One leg was said to have been deposited at the grave of Viriula,* but this we very much doubted.

Mr. Waterhouse spoke to the chief very impressively on the subject, pointing out all the evils which follow in the wake of cannibalism. I saw very distinctly that this savage was quite ashamed of himself; but I saw also that, if he did feel inclined for the tempting morsel, there was now very little chance of our seeing him in the act; but, for my own part, I am quite satisfied, and do not now desire further ocular demonstration of the existence of cannibalism in Fiji.

We have every reason to believe that the portion of the last *mbokola*, which Na Ulu Matua asserted had been placed upon the "rock," † was eaten on the sly by this cannibal, whose morbid

* The deceased king, and father of Koro Ndua-ndua.

† Where the remains of the last chief were laid.

taste for human flesh was acknowledged by all the people in the town.

It is said that the chiefs alone partake of human flesh, it being too delicious for the common people to feast upon. Jobi, a Tongan native, and one of our party, happened to stumble into the chief's house, and he distinctly saw a human hand hanging in the smoke over the fireplace. Now, although the distribution of all the other parts had been accurately detailed to us, no mention was made of this, so that the dissimulation of Na Ulu Matua was clear enough. Most probably, had we approached the spot, the inviting morsel would have been quickly conveyed out of the way. Mr. Waterhouse was informed that the chief continued to eat his portion at intervals throughout the day, until it was all demolished; but an old favourite in the town helps him out with it.

When a wish was expressed to see the portion which he stated had been placed on the "rock," he remarked, with a transparent cunning, that very probably the dogs had eaten it. When Mr. Milne visited this rock, he saw several broken skulls and other bones, which appeared to him to be those of a pig; but some time after, when we went to see the spot, we found it swept and garnished. The occurrence of pigs' bones was likely enough, as Harry informed us that large pigs were frequently offered up to the presiding spirits.

Viriula, the father of the present chief Kuro Ndua-ndua, is said to have been the parent of sixty children, by numerous wives.

On our first arrival at Namasi, we heard that a beardless youth had eloped with his aunt, who was the wife of a petty chief. Having spent a few days in the bush, they ventured to a town near Namasi; but, unfortunately for them, the woman's brother happened to be in the town, and the enraged brother uplifted his club to kill her, but she prayed rather that she might be strangled. This request was quickly executed, and the young lover desiring that he should be strangled also, shared the same fate and died with her. Two persons were thus launched into eternity by the hands of a man who had brought us food the same morning. It appears that, if the youth had not been strangled at the time, he would have been clubbed by his own brother whenever they met. Such is the fearful state of things at present existing in this benighted region, where the wickedness of man alone sullies one of the most charming countries in the world.

31st, *Sunday*.—We had a short service in our mbure, attended by the principal chiefs and one or two visitors from the mountains, our own party including several men from the Soloira district. Mesaki, our excellent friend, whom the Rev. Mr. Moore com-

missioned to join us from Rewa, preached a short but impressive sermon beautifully adapted to the occasion. The truths of Christianity were boldly but respectfully submitted to the consideration of the heathen party. Our host, the celebrated Harry, declared that he never could have believed it, had he not heard it (alluding to the talented discourse of the native). Ko Mai Naitasiri, as usual, wept bitterly during the prayers. After the sermon, Mesaki, Jobi, Katu Yako, *alias* Benjamin, and others from Mbau, were engaged in good-humoured argument with the chiefs, whose false principles seemed to have suffered a severe shock. They stated, however, that Koro Ndua-ndua and his party must first embrace Christianity before they could venture to do so.

In the course of the evening a very laughable representation of a spirit was enacted by one of the natives, dressed in banana-leaves, with a large, massive wig on his head, and a mask formed from the bark of a tree and dyed with turmeric. He flaunted along by our mbure in a most theatrical manner, and startled the more youthful members of our party.

1st September.—After breakfast, Mr. Waterhouse and I set out, in company with Na Ulu Matua and Harry, to visit the little river called Wai ni Ura, where Harry supposed he had fallen in with the philosopher's stone. We ascended a mountain-ridge with precipitous sides, titoko in hand, and, having reached the top, commenced our descent into the next valley, through which the Wai ni Ura flows. The scenery was indeed very grand, but the footing was exceedingly difficult. Having selected some specimens of the rocks, and refreshed ourselves with a draught from the cool stream, two alternatives presented themselves to us, namely, to descend the valley with the course of the river, stepping from one huge boulder to another, and scrambling along vertical cliffs, over which the water now and then came tumbling down, or to reascend the ridge and retrace our steps. The former was chosen, and, from the difficulty experienced, we have no particular desire to visit Wai ni Ura again. The titoko was of the greatest service to us in descending slippery rocks and jumping from one to another. The rocks are spangled with iron pyrites, which makes its appearance wherever the surface is broken, but we were not fortunate enough to discover gold.

An ore of antiimony, which we had at first mistaken for lead, was brought to us from Umbi, a distance of about 10 miles from Namasi, according to Harry. We did not visit the place, but were informed that the ore exists in considerable amount in the locality mentioned. It is said to occur in two large veins in the side of a hill, and, if one may judge from the quantities brought down by the natives in bamboos at different times, it must be very plentiful indeed.

September 2nd.—Formed an expedition to visit the celebrated Moti vai tala, at the division of the two streamlets which respectively open into the Namasi and Navua rivers. Na Ulu Matua and Harry accompanied us, and our walk through the vale of Ona Mbaleanga was very pleasing. We ascended a rich mountain valley to the left of Na Ndela ni Solia, and soon reached a clear babbling stream, dividing into two smaller streamlets at a very acute angle, the left branch trending to the Namasi river (Wai Ndina), the right one wending its way to the river flowing to Navua, on the south coast of Viti-levu.

The natives say that a moli (shaddock) tree formerly grew at this spot, and when the fruit of it fell into the last-mentioned stream it might soon after be picked up at Navua in perfect condition, but, falling into the Namasi streamlet, it became rotten before reaching the sea at Rewa. This is, in short language, the story of the Moli vei tala, so called, and it is often adduced by the natives to afford an idea of the relative length of the two rivers concerned. The distance of Navua from this place by the river which leaves the valley of Nuku Tambua is computed to be about 20 miles, and it cannot be less than 91 from Rewa; so that the tale of the Moli vei tala is very likely to have been founded on fact.

We saw but one young moli tree, growing where the original one stood; but Mesaki, our good friend from Rewa, in true native spirit, had very silently brought up another young plant from Namasi to occupy the vacant spot, that Nature herself might perpetuate the tradition.

On turning over the dead leaves near a large mass of rock in this locality, we obtained a profusion of *Truncatellæ* and some few *Diplommatinæ*. The genera *Egea* and *Helicina*, so usually found with those just mentioned in other places, are very scarce indeed throughout all the districts examined.

September 3rd.—We collected our party together, bid farewell to the Namasi people, and commenced our march, passing through very picturesque and beautiful country, and occasionally crossing the river.

Going towards the place where our canoes were hauled up, we noticed some offerings made to the spirits of the dead, consisting of boiled Ndalo, laid out on pieces of masi, supported by four uprights rudely cut from the bush, thus forming a primitive sort of altar.

All our gear was now distributed among the little canoes in charge of the poling crew, while the greater number of the party continued their route along the banks of the river until it became deep enough to proceed without continually jumping out to drag the frail craft over the shallows.

We reached Nondo Yavu early in the evening, and, as the day was too far gone to continue our course to Vuni Mbua, we slept at the former place, where we met with the greatest civility from the people. A member of the council was deputed to express the regret of the old gentleman previously mentioned that we had not been received on our last visit with as much hospitality as they could have wished, and begged that we should remain the next day in order that a feast might be prepared for us. As one of our party was ill, however, we could not make further delay, so politely declined the invitation. But in the morning early, anticipating our departure, baskets of cooked yams and taro, with a large pig, were presented to us with the usual ceremony, and accepted Vaka Viti (Fiji fashion).

September 4th.—On our way to Vuni Mbua we recognised the Mata ki Naitasiri* sitting on a bank awaiting our arrival. He stated that he had been sent with an invitation from Ko mai Vuni Mbua, the Soloira chief, to put up at his town that night while food was being prepared for a feast. This, of course, we were also obliged to decline, as we had arranged to make the best of our way to Naitasiri.

Having made a sketch of the chief in ordinary attire during our last visit, he now appeared on the bank of the river to greet us, enveloped in folds of white masi, with a large pearl oyster-shell, handsomely bound and inlaid with ivory, after the manner of the drawing, and expressed a desire to have these things added to his portrait.

Mr. Milne determined to perform the journey to Naitasiri by land, so enshrouding himself with havresacks for his plants, he marched off under the guidance of a young Soloira chief, while we continued our course.

A dark-coloured eel, about 4 feet long, rapidly crossed the stream near this spot; and, when we approached the branching of the river, some men in the foremost canoes cried out "a nggio, a nggio" (a shark, a shark), and one struck at it with a pole. It made off, however, unhurt, though not before we saw enough of it to satisfy ourselves that it really was a shark, or a very close ally.

We reached our old quarters at Naitasiri after dark in the evening. Mr. Milne had arrived before us, having travelled nearly in a straight line from Vuni Mbua through fine open country, the distance appearing to be about 15 miles.

September 7th, Sunday.—We had a short service in the morning, conducted by Mr. Waterhouse, while Mesaki preached at a neighbouring town. The breathless attention of the natives to all that had been said was very striking, and on the part of the females especially the deepest feeling was evinced.

* Messenger to Naitasiri.

Mr. Waterhouse and I went across the river the following morning to explore a richly-wooded district, through which a beautiful stream trickled down to a deep creek. Near the water's side we found a small caracolla and some helices. On turning over the dead leaves we saw the tail of a bluish-black snake peering from beneath a loose clod of earth; but, although we had the assistance of a native, the animal succeeded in making its escape. It seemed to have vanished into the earth in a most mysterious way. We ascertained that this was the snake called mbolo by the natives, which, if seen in the path by warriors going to battle, is considered an evil omen.

September 9th.—We strolled with Ratu Vaka Ruru to see his yam gardens. One of these contained about 600 mounds, and upwards of 50 natives were hard at work making an embankment around it. We expressed a wish to eat a shaddock, and a lad was immediately despatched to climb a favourite tree and select one or two for us. While up in the tree, the boy observed a snake coiled round a small branch; we hastened to the spot to see if it were anything new. It proved to be a species of the Coluberidæ, of which we had previously obtained several specimens; but there was a large tick adhering to a raw part of his tail. This tick is known as the Kutu ni Ngata, or snake-louse, and pigs which go into the bush are often attacked by it. The natives believe that the pigs derive them from the snakes, because those pigs that remain in the towns are not infested by them. The casual visitation of these loathsome creatures, however, was shown to us by the fact that our chief removed one which had attached itself to his leg.

The young chief showed us an enchanted stone, lying at the root of a venerable tree, and said to have been once a shark, but now transformed into stone. A small hole in the stone was pointed out as the place where the shark was speared. In former times this stone was regarded as a god. The chief drew forth an arrow, which remained as a relic of the Soros, which had been offered at this shrine.

Dagwell constructed a "trot," with the assistance of some of the natives, in hopes of capturing a shark. The hooks were fastened to a strong line of sinnet with a very fine material stripped from the bark of the hibiscus. The scheme, however, proved ineffectual, as many of the hooks were found snapped across and the line was ultimately carried away.

While at Na Noudra Yavu, death-guns were heard at some distance, and the natives affirmed that they had seen fire in the direction of a town called Matai Mbau; but they were unacquainted with the particulars of the case. Further on, however, we ascertained that the death lali had been also heard at the same time. Three days previously the people of Matai Mbau had

attacked a neighbouring town and were repulsed with a loss of three men, one of whom was a chief, after which several houses in their own town were burnt, out of respect for the dead. But the most particular part of the proceeding, if not the most ridiculous, was the destruction of the mbure, to express their anger with the deity for not having yielded them succour in their rash attempt. We also heard that the wife of the deceased chief had been strangled.

We spent some days at Naitasiri to recruit our party, and formed an expedition to ascend the Muna Ndonu; though we did not think it possible to ascend very far, as the tribes on opposite sides of the river were reported to be at war, and we might be readily mistaken for allies of either side before it could be possible to afford an explanation.

We first proceeded to Viria, where we remained some little time, by special invitation of the chief. A grand ceremonial, as usual, preceded the presentation of some axes, knives, and whales' teeth—a duty which generally devolved upon Ko mai Naitasiri, and *apropos* speeches followed on both sides.

We next visited Vura Tavola, where we made a short stay, examining the surrounding country. We obtained two small snakes here, called respectively MBolo damu and MBola loa, in addition to the Ngata damu, of which many specimens had already been sent home.

Physæ abound in the fresh-water streams and pools, and the Cyrenæ attain a very large size up this river. A small Tornatellina was picked off some leaves casually brought on board the canoe.

Proceeding up the river from Vura Tavola, we met with numerous zigzag fish-fences stretching across the river. A bamboo basket was placed at every angle, and a little soro, constructed of makita leaves, &c., occupied a grassy bank on one side. It is said that the fishermen constantly bring food to the spot to propitiate the presiding deity of the water. We saw a native examining one of the baskets, and found that he had caught a fish in it. A stick of tobacco purchased the fish, which was at once recognised by the Mbau men as a salt-water species, to which they give the name Ika damu, or Red-fish.

In attempting to cross one of these fish-fences a few miles further up the river, some armed natives belonging to Na Koro Mbau Mbau and the Nai Lenga tribe warned us back, signifying that all who passed were regarded as their enemies, so that we should incur their vengeance by doing so. Some of the bravest amongst them ventured to the front, while numbers were in the long grass with muskets and other arms ready for an attack. Many of our party were exasperated at their impertinence, and would have readily

engaged to effect the right of passage in the river, but were restrained by better motives. We were anxious also to avoid the slightest mishap at the hands of these savages, and thought it the more advisable to return peaceably and organise another trip to ascend the Wai manu.

In returning we called upon the chief of the nearest town to represent the case, and begged that no warfare should result from the evident desire to punish the offenders on our account. The chief had been engaged on the opposite side of the river attending to his gardens; but was sent for, and he returned in great bustle. He was an elderly man, and, like most chiefs, very superior to the people by whom he was surrounded. Then came the greeting, and presentation of yanggona, with appropriate speeches as usual. The chief and all his counsellors present were astonished at the forbearance of the Christian party, and were still more surprised to hear such things from the lips of our chief Ko mai Naitasiri, addressing him in somewhat these words:—"In former times you presented whales' teeth to us to come and help you in more trivial matters, and our people have frequently fallen in the contest; but, now that you have been so grossly insulted, you desire us not to punish these wicked men." They referred the change to the right source, the influence of Christianity, and heard with great interest Mr. Waterhouse's representation of the nature of and blessings attending this only subjugator of the savage will.

Having bid adieu to Naitasiri, we returned to Navuso and made arrangements for a trip up the Wai Manu. The water was very deep in many parts of this river and very shallow in others, so that we frequently experienced much difficulty in urging the canoes along; indeed, we had to discard the large one altogether when about 12 miles on our way.

The scenery on the Wai manu is very beautiful, on account of the great diversity of the surface and the richness of the forests. The distant mountains now and again peeped between the slopes of the hills, or, when we gained an elevation, stood up boldly against the horizon.

From the bank on which our canoe was hauled up we followed a well-beaten path over a ridge or spur leading to the high land on which the town of Koroi stood. From this elevated spot the surrounding country presented the most charming aspect, enlivened by a narrow strip of the sea (our first glimpse of it for the space of six weeks), with the islands of Ovalau, Wakaya, Mbatiki, Nairai, and Ngau spread upon its bosom. The forests in this district are exceedingly dense and stored with valuable timber.

The sedimentary rocks composing the height of Koroi abound in Foraminifera. Fossil * impressions, or rather casts of animal and

* Many interesting specimens of these fossils have been collected.

vegetable structures, were everywhere to be seen, so case-hardened apparently by a superficial layer of the oxide of iron, that their forms stand out in bold relief on the large slabs of rock over which the natives continually walk, the surrounding material being worn away by their feet. The original organised structures have been completely substituted by the common materials of which the rocks are composed. We noticed in many places large masses of breccia, like that of Namasi or Ovalau, scattered about amongst the stratified rocks, in the most unaccountable manner.

This whole region is full of interest to the geologist, who may examine the layers of an ancient marine bed, now elevated about 400 feet above the level of the sea, and abutting against mountain masses of breccia and conglomerate, consisting of fragments of close-grained primary lavas, cemented together by minute detritus of the same materials.

We ascertained in a roundabout way that Ko mai Naitasiri had sent off a messenger to Vuni Mbua with whales' teeth for the presiding chief, requesting that he would send down the fishermen of Soloira to meet us on the Wai Manu and show us the sport of diving for the Ika loa (a black mullet, which is never seen at the surface, but always lives in the deeper parts of the river, feeding round the rocks at the bottom).

On our way to the forests, about four miles beyond Koroi, we met the Soloira messenger, who commenced delivering his message in the sitting posture, and ever and anon, as our canoe was slowly advancing, he made a few strides on the bank and again resumed the sitting posture to continue his report. This was to the effect, that Ko mai Vuni Mbua was desirous that we should take up our quarters in the bush for the night, so that the divers might assemble the following morning. Expecting a good day's sport, we agreed at once to this proposal, and poled along in our little canoes to a spot where some native carpenters had constructed a rude shed to shelter them while engaged felling timber and cutting out canoes.

Approaching our destination, we observed Mr. Milne, who had preceded us, emerging from some dense foliage on the left bank, and soon afterwards two attending natives made their appearance with the botanical boxes full of specimens. We found that the shed was rather small for our party, but Ratu Vaka Ruru and several of the Mbau chiefs augmented its dimensions in a very few minutes with bamboos, tall grass, and wild banana and ndalo leaves, all of which materials were procured on the spot.

In the course of the evening a party of Soloira men made their number, bearing no less than 32 fine specimens of the Ika loa, for which they had been diving while approaching the rendezvous.

An immense lovo, or native oven, was now constructed to cook the fish; but as they were not likely to be ready before the next

morning, we kept two or three for our immediate use, and they proved most excellent eating.

Torches, consisting of long bamboos split up at the end, were soon flaming about in all directions. A permanent stationary light was obtained by burning the dammara gum (Makandre) on a large stone. The old chief fed the flame very assiduously with small pieces of the gum, cautiously inserting one after the other, while he kept up an animated conversation on Fijian topics. The Soloira men encamped near us, and we occasionally heard the discordant uproar, signifying that the yanggona bowl was ready; and the whole scene, with all its accessory circumstances, was well calculated to call up in one's mind the vulgar conception of the other world.

On the following morning Ko mai Vuni Mbua and his brother Vere Malumu presented themselves, and, when the greeting was over, we collected our things together, and followed the fishing party, which preceded us in the direction of Koroi. The deep parts of the river were selected for the sport, and a circle of divers closed in towards the middle, frightening the ika loa into nets of very simple construction held open to receive them. The divers appeared much exhausted on coming to the surface; and fires were lit on the nearest gravel beach, around which they assembled to warm themselves and recruit their energies. This novel mode of fishing was so assiduously carried out by the Soloira men, to exhibit their justly-reputed skill in capturing the ika loa, that when we returned to Koroi we could not have had much less than a hundredweight of fish to dispose of. Here Ko mai Vuni Mbua and his people took leave of us, bearing off in triumph the presents which we distributed amongst them.

We spent one day more at Koroi collecting specimens from the fossiliferous slabs of rock, and examining the forests in the vicinity; and when we had almost formed a resolution to explore a portion of the south coast, where coral beds are said to have been elevated to a considerable height, we obtained information of the arrival of the Herald at Ovalau. We therefore returned to the ship with as little delay as possible, bringing with us, by their own particular desire, both Ko mai Naitasiri and his nephew Ratu Vaka Ruru, whose urbanity, unsolicited fidelity, and, in a word, princely conduct towards us, claimed our warmest gratitude.

APPENDIX.

LIST of Towns on the banks of the Wai Ni Ki, proceeding from Kamba to the Wai levu (Rewa River), and entering it about 6 miles from its principal mouth.

Left bank (ascending).

Kamba.
Ndaku.
Nai Vakathau.
Na Mbo thirva.
Mhuretu.
Kiuva. }
Kiuva i ra. } Kiuva.
Mbulia. }
Namoli. } Nakelo.
Vaturua. }
Tokatoka. }
Ndromuna. } Tokatoka.
Vanua Ndina. }
Lomai na sau. }
Nuku tolu. }
Na Suekau. }
Vuthe. }

Right bank (ascending).

Thaulata.
Vaton.
Wai thoka.
Mokani.
Nai songo Vau. }
Ndravo. } Ndravo.
Thakova. }
Matai. }
Ndravotu.
Wai Kele.
Narna si saisai.
Namuka.
Va Kele.
Nakelo.
Na Kau levu.
Vutu Vou.
Muana.
Ndravuni.
Tumavia.
Na luna.
Nuku na Tonga Ndravu.
Nuku Nasilai.

List of Towns on the Wai levu, commencing at the mouth of the Wai levu and running to the point, where it divides into the Muna Ndonu and the Wai Ndina.

Lauthala, a small town occupied solely by the U.S. Commercial Agent and some foreign residents.

Nambulok.

Vuni ivi Ndeke.
Na Koro levu.
Na Vasa.
Koro i Mbithi.

Wai loa.
Navuso.

Mataisuva, Wesleyan Mission Station.

Vutia.
Narothivo.
Na sau.
Muana.
Nandoi.
Rewa.
Natho.
Nakorovau.
Nde ni vula.
Nalasi.
Nambuli.
Nandungutha.
Waivo.
Mburembasanga.
Moli-tuva.
Na Ndonu.
Vusuya.
Lewa i ra.
Na ndali.
Nousouri.
Verata i wai levu.
Na linga.
Kasavu—At the westward bend of the river.

Nakaudi.	Koronggangga.
	Naitasiri.
Viti.	Tovutovu.
	Natoa ika.
	Matai Mati—Shoals commence.

List of Towns on the Wai ndina, or left branch of the Wai levu.

Nanggali—Tidal influence ceases here.	
Na vei sama sama.	
Na tho sui.	
Na Mbitu vula.	
Na Mbi Kau.	
Na Kuluva.	
Na Vakandua.	Ndelavu.
Vuni Mbua.	Karavatu.
Na Koro Vulavula.	Na ulu vatu.
Nondra yavu na ta thoka.	Nai Vakaruku.
Nau.	Mataimbau.
	Na Mbulimbulia.
Na vunga yanga.	Na Seivon (Host springs).
	Ndelai Lasakau.
	Na sinu mata.
Wai ni Mbi.	Tumbu waivaka.
Nailili.	
	Namosi.

List of Towns on the Muna Ndonu.

Viria.	Tausa.
Wai Mali.	Vuna.
Na Vuthu.	Na mi Ka.
Vuni Tavola.	Ndere i valu.
Na sama.	
Na tavea—Tidal influence ceases.	Koro Mbaumbau.

List of Towns on the Wai Manu.

Na ivi Kinda.
Nai vui vui.
Koroi.

Rough estimation of Distances.

	Miles
From the mouth of the Rewa River to Navuso	12
„ Navuso to Naitasiri	12
„ Naitasiri to the mouth of the Wai Ndina	12
„ the latter to Na Mbai Vatu	12
„ Na Mbai Vatu to Vakandua	7
Here we obtained our nearest position to Mbuggi levu, which was about 2 miles off.	
From Vakandua to Vuni Mbua	4
„ Vuni Mbua to Nondra yavu	4
„ Nondra yavu to Na seivan	12
„ Na seivon to Namasi	12
„ Namasi to Motivaivala	4
Total	91

The forest country of both Vanua Levu and Na Viti Levu lies to the southward; but it is that of the latter island alone which demands notice in the present Report.

We were credibly informed that forests of Pammaras occur along the banks of the Navua river, which opens on the southern coast about 30 miles from

Matai Suva; so that timber to almost any amount might be felled and rafted down the river, by native labour, at a trifling cost. Kuro Ndua Ndua, who is the independent sovereign of the whole district from Navua on the coast to Namosi in the interior, is the chief, with whom all such matters may be satisfactorily negotiated. Forests of Dammaras and other valuable woods abound between Namuka and Serua on the southern coast. Although the following list gives a general summary of trees available as timber, it cannot profess to include all.

List of Trees used for the Manufacture of Canoes and applicable to other purposes requiring large Timber.

1 Ndakua ndina, (true)	Dammara.
b " leka, (short)	"
c " Mbalavu, (long)	"
2 " salusalu.	} Small-leaved Taxineæ, bearing excellent timber, particularly the Ndakua Salusalu.
3 Kau tambua.	
4 Kau solo.	
5 Vaivai (ni Veikau).	
6 Vaivai (ni wai).	A leguminous plant, generally used for boat boards.
7 Visi.	A durable reddish-brown hard wood, probably the green heart of India.
8 Ndanamu ndina.	(Callophyllum), straight, and much used for the masts of canoes.
b Ndamanu ndongondongo.	Not very servicable.
c " thevatheva.	A very good wood.
d " Ulu ni Kati Kati.	
9 Yasi.	Hard, heavy, and durable.
10 Ndawa.	An excellent wood; the fruit used as food.
b " vatu.	Fruit hard.
c " mali.	Fruit large.
d " sere.	Fruit white outside, red in.
e " Kuluidamu.	Fruit red-skinned
f " sisithi.	Fruit small (like a gasterspod shell).
g " Mbuka.	Fruit yellow.
h " Nduru i yanasmu.	Fruit small, like the Karawan.
i " nda ni Kalavu.	
k " sawa.	Fruit has flavour of arrowroot.
l " yambia.	
m " lembe.	Fruit like the lembe.
11 Ndoi (of Viti levu).	A white wood, large.
b " (of Vanna levu).	A red wood.
12 Uto (bread fruit).	A light close-grained white wood.
13 Tavola.	Fruit edible, timber useful.
14 Tarawau.	This fruit, having no false or unfruitful blossoms, is chosen as the emblem of the truth-speaking man.
b Tarawau Kei na Kaka.	With strongly-scented flowers.
15 Lekutu.	
16 Ndavata.	
17 Tivi.	
b " tavolo.	Like the Tavola.
18 Mbau.	A beautiful reddish or brown wood.
b " tandra.	
c " Vuti.	
d " somi.	
19 Vulavula.	Timber; very useful.
20 Masi i ratu.	White, soft, and perishable.
21 Nduvula.	

- 22 Ndilo. (Callophyllum), wood durable and susceptible of polish.
- b „ mbalavu.
- c „ Leka. Valuable in ship-building for knees, &c.
- d „ ndilo, or Ndamanu. The “Tamanu” of Tahiti according to the Rev. D. Hazlewood.
- 23 Malamala.
- b „ vuti. Rough.
- c „ ndamu. Red.
- 24 Malili.
- 25 Sa.
- 26 Laumba.
- 27 Kau ndamu.
- 28 Ngati.
- 29 Kavika. (Eugenia).
- 30 Maku. A light, straight, soft grained wood.
- 31 Kan loa. (Black tree).
- 32 Ndrila. (Erythrina Indica).
- 33 Mokusui. Straight and tall but not very good for spars.
- 34 Sathau. Bears its fruit octennially.
- 35 Ra Maia.
- 36 Laulaungai.
- 37 Mbausa.
- 38 Vure.
- 39 Ndulewa. A heavy and hard wood.
- 40 Kautoa.
- 41 Mbaka. A very majestic tree.
- 42 Kau Karo.
- 43 Yutu ndina.
- b „ votho.
- c „ Kalau.
- 44 Wathi wathi.
- 45 Uthu uthu.
- 46 Mbu me mbeka.
- 47 Sausaula.
- 48 Nomosa.
- 49 Ivi.
- 50 Ndaago. A large mangrove.
- 51 Ulu bu Kura.
- 52 Ndirini.
- 53 Lindi.
- 54 Veiwaru.
- 55 Nggulia.
- 56 Noko.
- 57 Ta ndalo.
- 58 Makita. Useful for spears, and leaves used for thatching.
- 59 Serua.
- 60 Wi.
- 61 Mbua Ndromu.
- b „ toko.
- 62 Mbuambua. Wood resembling box.
- 63 Loaloa.

Trees employed in the Manufacture of Clubs.

- 64 Nokonoko. (Casuarina), a hard and durable wood.
- 65 Velau.
- 66 Saulaggi ndina. } Useful woods.
- b „ ndamu.
- 67 Saru Saru.

- 68 Vunga.
69 Lava rua.
70 To manu.
 b „ wiwi.
71 Vatu ni mboro.
72 Masi.

73 Se lavo.
74 Vau.

The leaves are rough like sandpaper and applied to the same use.

(Hibiscus), the bark is used for cordage.

PALMS.

- Niu.
" sawa.
Viu.

Cocoa-nut, several species.

Species of Areca.

With flabelliform leaves.

ZOOLOGICAL LIST—Drawn up with the Native Names to facilitate further inquiry.

Bats.

- Mbeka ndina, or loa.
 " ndamu.
 " lulu.
 Mbekambeka.
 Manumanu vaka Mbui.

Tailless.

Tail included in the inter-crural membrane.

With a long exserted tail.

Birds of the River.

- Nga Viti, or loa.
 „ ndamu.
 Mbelo.
 Visako.
 Visaka.

Wild Duck.

Teal.

Bittern.

Smaller species.

The smallest species (light fawn colour)

Snakes.

- Ngata ndamu Kuro.
 Ngata ndamu.
 " mbambawavuti.
 " yasi.
 Mbolo loa.
 " ndamu.

Takes its name from the similarity of its colour to that of a Fijian pot.

Red snake.

Reddish, with an ashy or slate-coloured belly.

The largest of all.

Small, black.

Small, dull-red.

Fishes peculiar to the Fresh Water.

- ka loa (black).
Ndeke loa.
" ndamu.
Mbau.
Voloa, or Vola.
Teatia.
Ngandro.
Voseu.
Vovuti.
Ndandarikai.
Mbandira.
Nggio.

Mugil, with the habits of a rock fish.

About 10 inches long.

About the size of Ndeke.

Small.

Spotted muræna.

Large eel.

Shark (?)

Fishes found in the Fresh Water but said also to exist in the Sea.

Sangka.	Large fish (Scowberidæ).
Ika ndamu.	Red fish.
Yawa.	
Mbati Kasivi.	Called Matamba on the coast and said to be daily taken down with the floods. (Percidæ.)
Vetakau.	A broad fish.
Kanathi.	A mullet (?)
Nggiawa.	(Percidæ).
Reve, or wruwru.	(Percidæ).
Vuvula, or singa.	(Large).
Yawa.	(In ponds)—when large it is called Wailangi. One is said to have been caught at Navuso 5 feet long and 3 in girth (?).
Ika Ndroka.	(Percidæ).

List of Macrourous Crustacea.

Mothe.	{	Transparent Palæmonidæ, believed by the natives to be different stages of the same species, but such is not the case.
Lua.		
Kaudikandi.		
Ura ndamu.		
„ mbala.		
„ mbati.		
„ „ tambua.		At Vuni Mbua.
„ ndina.		
„ ivi.		
„ vula.		(Atya).
„ loa.		
„ ndu.		
„ ngauvithotho.		
„ ngasau.		

The Mollusous Genera have been already sufficiently noticed in the text.

XIV.—*Description of Vancouver Island.* By its first Colonist, W. COLQUHOUN GRANT, Esq., F.R.G.S., of the 2nd Dragoon Guards, and late Lieut.-Col. of the Cavalry of the Turkish Contingent.

Read, June 22, 1857.

1. *Position, General Aspect, and Geological Structure.*

THE position and natural advantages of Vancouver Island would appear eminently to adapt it for being the emporium of an extended commerce. It contains valuable coal fields, and is covered with fine timber. The soil, where there is any, is rich and productive; the climate good; and the singular system of inland seas by which it is environed teems with fish of every description. Capable of producing those very articles which are most in demand in neighbouring countries, and offering, in its numerous safe and

BRITISH NORTH

AMERICA

PACIFIC OCEAN

Map of
VANCOUVER ISLAND,
with the adjacent Coast,
to illustrate a
description of the Island
by P^r Col W C Grant

1856

Scale

Latitude W from Greenwich

Grays Harb

Chehalis R

John Brown Smith

Approximate Position of an Interior Range of Mountains as seen by Vancouver when surveying the Gulf of Georgia and Johnstone Strait covered with Snow in June

Gulf of Georgia and Johnstone Strait

Admiralty Channel

Johnstone Strait

Strait of Juan de Fuca

Strait of Georgia

Strait of Barclay

Strait of Nootka

Strait of Clayoquot

Strait of Nootka

Strait of Nootka

Strait of Nootka

Strait of Nootka

Strait of Nootka

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commodious harbours, almost unrivalled facilities for import and export, it would seem to require but a little well-directed exertion of energy and enterprise to make it the seat of a flourishing colony.

The island is situated between the parallels $48^{\circ} 20'$ and 51° north latitude, and in west longitude between 123° and $128^{\circ} 20'$; its coast trends in a north-west and south-east direction; its extreme length from Cape Scott to Point Gonzalez being 270 miles, with a general breadth of from 40 to 50 miles; its greatest breadth is 70 miles, being from Point Estevan, at the south entrance of Clayoquot Sound, to Point Chatham, at the northern extremity of Discovery Passage; its least breadth, namely from about 20 miles south of Woody Point to Port Bauza, is 28 miles. There are, however, several places in which the arms of the sea, running inland from opposite sides of the island, approach very closely to each other. In the north, for instance, from Beaver harbour to Koskiemo, the extremity of an inland loch, running in immediately opposite, the distance is only 8 miles. From the Alberni canal on the west, to Valdez inlet, called by the natives Saatlam, on the east, the distance is only 22 miles; again, in the extreme south, a rough journey of about 7 miles brings the pedestrian from Sanetch, on the Canal de Haro, to the end of Esquimalt harbour on the Straits of Fuca; and from Nitinat, between Barclay Sound and Port St. Juan on the south-west, in a day and a half the savages pass over to the valley of the Cowichin in the south-east. The general aspect of the country throughout the island from the seaward is peculiarly uninviting. Dark frowning cliffs sternly repel the foaming sea, as it rushes impetuously against them, and beyond these, with scarcely any interval of level land, rounded hills, densely covered with fir, rise one above the other in dull uninteresting monotony; over these again appear bare mountains of trap rock, with peaks jagged like the edge of a saw, a veritable Monserrat, forming a culminating ridge, which may be said to run with little intermission, like a back bone, all down the centre of the island, from the northern to the southern extremity; nor does a nearer approach present one with many more favourable features in the aspect of the country.

The whole centre of the island—as far as it has been at present explored—may be said to be a mass of rock and mountain, and of the little available land which is found in patches along the sea-coast, by far the greater part is densely covered with timber, the removal of which would be so laborious as to make the bringing of the said land under cultivation scarcely a profitable undertaking. The little open land which there is, however, is in general rich, and had the British Government thrown the island open to the exertions of individual enterprise, the greater portion of such open land

would doubtless, ere this, have been settled. It is not, however, always that the wooded land is capable of cultivation along the sea-coast; on the contrary, the reverse is the rule; the greater portion of the land on the southern, and nearly all on the western coast, as far as it has yet been examined, consisting of barren rock, barely affording sufficient holding ground to the stunted timber with which it is covered.

The geological structure of the island corresponds with its physical aspect. The prevailing formation is that generally known as the gneiss and mica-schist system: these rocks produce a broken and rugged surface, without being attended with any picturesque effect. Along the sea-coast on the eastward, from Nanaimo to Sanetch, the principal surface rock is sandstone of the coal formation. From Sanetch to Esquimalt gneiss prevails, diversified with beds of dark-coloured limestone. Westwards of Esquimalt mica slate occurs, whilst from Rocky Point to Port St. Juan the principal rocks on the sea-coast belong to the clay slate and greywacke systems, interspersed however at intervals, few and far between, with cliffs of a white coloured close-grained sandstone.

These strata of sandstone lie generally tolerably level, with a dip of about 7° to the south; they are covered with beds of lightish yellow finely laminated clay, of from 100 to 20 feet in thickness, over which is generally to be found a layer of from 2 to 4 feet in thickness of rich black vegetable mould; the sandstone beds do not occur often on the south coast, seldom extend at a time for more than 2 miles along it, and in no case that I know extend beyond that distance into the interior. At Soke harbour the rocks on the east side are a coarse-grained highly-indurated greywacke, interspersed with crystals of hornblende and iron pyrites; on the west side a tolerably level bed of sandstone reaches to a distance of about 1 mile inland; at the back of this rises an amorphous mass of hornblende schist, which reaches an elevation of 700 feet. Ascending the bed of Soke river, we pass for a mile and a half through the sandstone strata, these again give place to greywacke. About $4\frac{1}{2}$ miles up, a dyke of greenstone runs across our course, over the irregular traps or steps in which the river precipitates itself in a series of foaming cataracts: this irruptive mass runs in a north-west south-east direction, and is about 2 miles in thickness. After passing it, the slaty formation again presents itself, the quality being a close-grained chlorite slate of a bright green colour. The stratification is not clearly defined in this rock, but the general dip may be about 30° , the direction being to the south-west. At 10 miles up the river we come to a beautiful blue fine-grained argillaceous slate, with the cleavage very clearly and regularly expressed. The surface of these rocks has been so broken and

distorted by some great subterranean convulsion, that the apparent plane of stratification is sometimes horizontal, at others quite perpendicular to the horizon. Some 3 miles beyond the commencement of this formation, we come to a trough of greywacke slate, containing a lake of about 6 miles in length, and with a general breadth of a quarter of a mile. On either side of this, with little or no level land intervening, rise steep mountains to a considerable elevation—one of those on the eastern side reaching an elevation of 2015 feet. The sides of this mountain are so entirely covered with detached blocks or fragments of granite, that it is impossible to see below them any solid foundation; on the top a level platform extends for some 300 feet in an oval shape. Although the rock contains aggregated crystals of quartz, felspar, mica, and hornblende, and no laminated structure is apparent, I am induced to call it a granitic variety of gneiss, partly because contiguous mountains decidedly exhibit the structure of the gneiss formation, and partly owing to the almost total absence of soil or any earthy substance—gneiss being a rock of much slower decomposition than granite proper: I have not indeed seen any pure granite on the island, except in detached blocks lying on other rocks along the sea-coast. These erratic blocks, sometimes of granite proper, but more frequently of syenite, are to be met with all along the sea-coast, in cubical masses of from 6 to 20 feet in thickness; they generally lie close to the sea shore, within a few yards of high-water mark; smaller blocks of similar quality are also found in the interior, frequently on the tops of the lower hills.

From the above particular account may be deduced a tolerably accurate idea of the general geological formation, on the south coast of Vancouver Island. It is, however, difficult to convey upon paper a correct impression of the interior, the sight of which, seen from the first eminence that he ascends, causes to the explorer a hopeless elongation of visage. The prevailing rocks in the higher parts of the island are gneiss and mica schist, in the lower greywacke and clay slate, the whole being interspersed and intersected in every direction by dykes of greenstone and hornblendic trap, the upheaving of which has produced such a distortion and dislocation to the surrounding strata as to give to the whole the appearance of a vast boiling mass, which had been suddenly cooled and solidified in its bubbling position. The hills are steep and rugged; the valleys narrow and shallow; the rocks are sometimes bare, sometimes covered with a scant growth of timber: but in no case, that I have seen, does the surface of the interior of the island, either in its nature or its position, admit of being applied to any more useful purpose than to furnish matter for the explorations of a geologist.

From these regions, which are wild without being romantic, and which, from the absence of any bold outline, never approach to the sublime or the beautiful, the traveller loves to descend to the smiling tracts which are occasionally to be met with on the sea-coast. In one of these Victoria is situated, and it is from a visit to it, and its neighbourhood, that tourists deduce their favourable ideas of the general nature of the island.

2. *History of Settlement and Population.*

In 1843, early in the spring of the year, the Hudson Bay Company first effected a settlement in Vancouver Island. They landed about forty men, under charge of Mr. Finlayson, and in a very short time constructed a picketed enclosure, containing the buildings usually appropriated by the Company to the storing of goods and to the accommodation of their servants. They landed at Victoria, called then by the natives Tsomus, from the name of the tribe which lives there: here they met with no opposition from the Indians, and, as soon as they had finished their buildings, they commenced bringing sufficient land under cultivation for the support of the establishment.

As in settling there no idea was entertained by the Hudson Bay Company beyond starting a fresh trading post with the Indians, the establishment remained in *statu quo* until the year 1849, when the granting of the whole island to the Company opened out a fresh field for their exertions; and about this time, viz., in the commencement of the year 1849, there were some 80 acres in cultivation round Victoria. The draft of the charter for the granting of the island to the Company was laid before Parliament in August, 1848, but the grant, however, was not confirmed until the commencement of the year 1849; and it was then given to the Hudson Bay Company under condition that, within five years, they should have established satisfactory settlements on it for the purpose of colonization.

The conditions under which the Company proposed establishing a colony were as follow:—They were to sell land at the price of 1*l.* per acre to all intending settlers, who were moreover to be obliged to bring out five men at their own expense, from England, or other British possession, for every 100 acres which they purchased, being at the rate of one man for every 20 acres; no single individual coming out was to be allowed to purchase more than 20 acres. Of the money arising from the proceeds of the sales of that land, 18*s.* 6*d.* in every pound sterling was to be applied to the benefit of the colony, only 1*s.* 6*d.* in the pound being reserved to the Company to remunerate them, as it were, for their undertaking the agency of the disposal of the land. Colonists were to be allowed

to work any coal they might find on paying to the Company a duty of 2s. 6d. per ton, and a duty of 10d. per load was to be paid on all timber exported. In June, 1849, the first batch of colonists under this system arrived, and they consisted of eight men brought out by myself; and from that day to this not a single other independent colonist has come out from the old country to settle in the island—all the other individuals, who have taken up land, having been in the employ of the Company, and brought out to the country at its expense.

In the Harpooner, in June, 1849, there were brought out by the Hudson Bay Company eight miners to work their coal mines at Fort Rupert, at the northern end of the island, who were to be paid a certain salary, from 50*l.* to 60*l.* per annum, and, in addition, were to get an extra allowance for every extra quantity of coal they got. There also came out in the same vessel two additional labourers to the Hudson Bay Company's establishment. On my arrival in the island all the land in the neighbourhood of Victoria and Esquimalt, which comprised some 40 square miles, and contained nearly all the available land then known, was reserved by the Hudson Bay and Puget Sound Companies. Matchousin, distant 11 miles from Victoria, was pointed out to me as the nearest unclaimed spot on which I could settle; not approving of which, as there was neither a harbour nor mill-power there, I was recommended to proceed to Soke, distant 26 miles.

The ship *Norman Morrison*, in 1850, brought out about eighty souls, who were entered as immigrants. In 1851 the *Tory* arrived with about 100 hired labourers. Of these parties, shipped as emigrants, the majority find their way to the opposite American side; and of the 400 men who have been imported in all during the past five years, about two-thirds may be said to have deserted, one-fifth to have been sent elsewhere, and the remainder to be at present employed on the island. By the Hudson Bay and Puget Sound Companies there are at present employed 45 at and in the neighbourhood of Victoria, 37 at Nanaimo, and 20 officers and men at Fort Rupert.

The population of the Island in the end of the year 1853 was about 450 souls, men, women, and children; of these, 300 are at Victoria, and between it and Soke; about 125 at Nanaimo; and the remainder at Fort Rupert.

3. *Distribution of Land, Nature of Soil, Crops, Climate.*

The gross quantity of land applied for in the island up to the end of the year 1853 was 19,807 acres and 16 perches, of which 10,172 had been claimed by the Hudson Bay Company, 2374 by the Puget Sound Company, and the remainder by private individuals. These lands may be classed as follows:—

	A.	R.	P.
1. Land registered without any payment being made thereon	9,829	0	0
Of this 7120 acres have been registered by the Hudson Bay Company, the remainder by private individuals.			
2. Land registered and deposit paid thereon of a dollar, or 4s. 2d. per acre, the claimants binding themselves to forfeit that deposit, or pay up the full price of 1l. per acre on receiving the proffer of title-deeds ..	1,211	2	0
Value received 784l. 15s.			
All this land is claimed by private individuals, and occupied by the same, ten in number.			
3. Land for which the full price of 1l. per acre has been paid	8,766	2	16
Value received 8766l. 15s.	19,807	0	16

Of this land 1696 acres 2 roods and 16 perches are occupied by individual settlers, 16 in number; 973 acres claimed by absentees and unoccupied; 471 acres occupied by the agents of absentees; 3052 acres reserved by the Hudson Bay Company; and 2574 acres occupied by bailiffs of the Puget Sound Company, 4 in number. Altogether, under the three above classes, there are 53 different claimants of land, about 30 of whom may be said to be *bonâ fide* occupying and improving their land. The system of paying a deposit of 1 dollar per acre, only lately introduced, has now been abolished, and parties have to pay at the rate of 1l. per acre previous to occupying their claims.

Of the whole 19,807 acres claimed or occupied as above, there are only between 480 and 500 acres now, at the end of the year 1853, actually in cultivation. All the land now under cultivation, with the exception of some 30 acres at Soke, and about 10 acres at Matchousin, is within the sections of land originally claimed by the Hudson Bay and Puget Sound Companies. The soil under cultivation is sometimes a rich vegetable mould, in other places a clayey loam, and in others somewhat sandy. It produces excellent wheat crops. Mr. Baillie has raised 44 bushels to the acre off some land which he farms for the Hudson Bay Company, about 3 miles from Victoria. Heavy crops of peas have also been raised in the same place. I myself, at Soke, raised excellent crops of wheat, barley, oats, peas, beans, turnips, and potatoes; Swedish turnips in particular did remarkably well, and produced a very heavy crop. I imported all the seed, except for wheat, peas, and potatoes, from Van Diemen Land, through the Sandwich Islands. In all arable portions of the island the land is favourable to the production of green crops of every description; vegetables also grow particularly well, and esculent roots of all sorts attain a great size. Oats have generally been a failure, probably owing to their having been sown too late in the season.

The climate, as usual on the coast of the Pacific, is divided into two seasons of dry and rainy, or, as Père Accolti, the Jesuit priest of Oregon, expressed it, "Huit mois d'hiver, et quatre d'enfer;" he added two months, however, to the winter for the benefit of Oregon. On Vancouver Island it generally rains and snows from October to March, and during the rest of the year a parching heat prevails, which dries up all the small streams. In the commencement of autumn dense fogs prevail, enveloping everything in obscurity, and preventing, as I think, the rays of the sun from having a due vivifying effect on the crops. These fogs also tend to absorb the dews which would otherwise fall; the consequence is, that all the crops which are not taken in early are apt to be parched up, and run to straw for want of moisture.

Although the thermometer sometimes reaches a height of 90° and 92°, that is, only during the few hottest days in August, the usual thermometrical range during the dry season is from 60° to 80°. The natives all along the coast have a custom of setting fire to the woods in summer, which doubtless adds to the density of the fogs, and increases the temperature of the atmosphere. I have never seen a drop of rain fall from March till October; the seasons, however, are uncertain. Last year there was a very severe winter; a great deal of snow fell, and the Hudson Bay and Puget Sound Companies lost a considerable quantity of sheep and cattle, whereas during the winter of 1853-4 there have not been above 20 days of rain and snow altogether.

The prevailing winds along the coast in winter are from the south-east, varying from that to the south-west, and with occasional heavy northerly gales; the prevailing winds in the summer are from the north and north-west. Generally speaking, the climate is both agreeable and healthy; and not a single death that I am aware of has occurred among adults from disease during the six years that I have been acquainted with the island.

4. *Trip round the Island, comprising description of Coal Mines, and all other Establishments.*

The most northern station occupied by white men is Fort Rupert. This post, situated on Beaver harbour, on the north-east corner of the island, was established by the Hudson Bay Company in 1849 for the purpose of working the coal which they were led to suppose existed in large quantities in its vicinity, as a quantity of superficial coal had been worked there by the Indians, which, however, was of loose and open structure, interspersed with slate, and of so inferior a quality that they have not yet been able to find a market for the whole of it. All efforts to find workable coal under the surface at Beaver Harbour have hitherto proved

totally unsuccessful; and the country in the neighbourhood has been so thoroughly examined by Mr. Gilmour, that there appears little reason to hope for any further discoveries in that quarter. A shaft was sunk to the depth of 90 feet by the Messrs. Muir, the miners who were first sent out from Scotland by the Hudson Bay Company; they principally passed through sandstone and shale, and passed through one or two little seams of coal, the thickest not above four inches in thickness. This shaft was continued by Mr. Gilmour to a depth of 120 feet, until he struck the whinstone rock, when he gave up farther search as hopeless. Another bore was sunk directly at the back of Fort Rupert to a depth of $47\frac{1}{2}$ fathoms. Two other bores were sunk behind Fort Rupert, towards the interior; one some 4 miles to the north-west, where the borers were stopped by loose quicksand at a depth of 30 fathoms; another two miles to the south-west to a depth of 40 fathoms; again 10 miles distant from Fort Rupert, along the sea-coast, two bores were sunk through sandstone to depths of 47 and $47\frac{1}{2}$ fathoms respectively, without any signs of workable coal; these were sunk at some distance back from the shore. Close to the shore two pits were sunk, one 17 the other 30 fathoms. Nearly all these bores were sunk down until the whinstone rock was struck, and in none of them were they successful in discovering any workable seam of coal, although several small veins were passed through, the thickest not exceeding 6 inches. There are now no miners at Fort Rupert, and the establishment consists of 20 officers and men. As the Indian trade there is unimportant, and as it was principally fixed on with a view to the coal, it is probable that it will ere long be abandoned.

There is some very fine timber in the neighbourhood of Fort Rupert, and a considerable quantity of it has been cut for exportation as spars and masts for vessels. Coasting along Vancouver Island to the south-east, a canoe or steamer will lead us through Johnson Strait and Discovery Passage to Cape Mudge. This strait is almost impassable to a sailing vessel, except with great danger, as a tremendous tide runs, and there is no good anchorage nor place of shelter along the coast. Cape Mudge was lately found by Mr Pemberton to have been placed, in charts previously constructed, 14 miles too far to the westward. In its neighbourhood the savages report some prairie-land, but I am not aware of any having ever been seen there by a white man. The coast from Beaver harbour to Cape Mudge, and for some miles to the south, appears rocky woodland, quite unavailable for purposes of settlement. Fifteen miles south of Cape Mudge we come to Point Holmes, where there are some 10 or 12 miles of rich open prairie-land close to the coast, offering probably a more favourable field for "agricultural" settlement than any other section of land

which has as yet been discovered on the island. South of this the coast again assumes its natural sterility. Between this and Nanaimo we come to Valdez-Inlet, called by the natives "Saatlam." This may probably become a place of some importance, as it is the nearest point to the end of the Alberni Canal, said to run from Barclay Sound on the opposite or west coast of the island. No favourable place for settlement offers itself on the coast between this and Nanaimo, in lat. $49^{\circ} 15'$, long. $123^{\circ} 45'$. Here the Hudson Bay Company has established one of their most flourishing posts. The coal at Nanaimo was first discovered by Mr. Joseph M'Kay, in May, 1850, who was directed to it by the Indians of the neighbourhood. They had seen a small seam on Newcastle Island, about 8 inches thick, and mentioned having seen some black stuff on the land opposite, called Commercial Inlet. This proved to be the outcrop of the Douglas seam, which was there only about $3\frac{1}{2}$ feet thick, the remainder being worn away by denudation; its general thickness is from 6 to 7 feet, with from 8 to 10 inches of fire-clay running through the centre; the dip of the Douglas seam is 45° ; its direction is to the south-west.

On the 15th September, the same seam, called the Douglas seam, was discovered on Newcastle Island, and the Indians soon got out 200 tons. A pit was commenced by Mr. Gilmour, with 10 regular miners, on the 17th September, and a shaft sunk to a depth of 50 feet, being through 12 feet of alluvium, 8 feet of sandstone, and 30 feet of shale; the situation of the pit is at the north-west extremity of Nanaimo harbour. Here they struck another seam of from 6 to 7 feet in thickness, lying on conglomerate; they are now regularly working this seam in several parallel galleries, extending to a considerable distance, already under ground. The seam here runs nearly level, with a dip of only some 7 degrees to the south-west; the greatest quantity of coal that has been raised from it was at the rate of 120 tons per week with 10 regular miners.

The same seam, "the Douglas," which was worked by the Indians on Newcastle Island and Commercial Inlet, has been discovered by Mr. M'Kay, who plied the pick and shovel indefatigably in search of it, cropping out on a peninsula at the upper end of Nanaimo Harbour, to this they are working a gallery on a level from the beach, and have already progressed several yards with it; the gallery is some 6 feet high and 4 or 5 feet broad. It is solidly lined and roofed with squared timber; they excavate at the rate of about 1 yard per diem, one miner picking and propping, and two shoveling and carrying the dirt, &c., away.

Work has thus been done at four different places: by the Indians at Newcastle Island and at Commercial Inlet, and by miners on

the peninsula above mentioned. These were all on the same seam of coal, which is called the Douglas; the greatest thickness which has been anywhere seen of it is 8 feet, its average may be 6; it is distinguished by containing 8 inches of fire-clay, and in the lower part of it are some 7 or 8 inches of cannel coal. In the other seam through which the pit is sunk, and which is the only one now worked, the coal is of a precisely similar quality, though without the fire-clay. Doubts having been entertained as to whether all these seams were not identical one with another, though raised by various causes, in different places, and at different elevations, a bore has been sunk close by the pit to endeavour to discover whether the other seam, called the Douglas, does not exist below; they have already gone through some 16 feet 9 inches of conglomerate, and 45 of soft sandstone with layers of shale; they then reached a coal of similar quality to that in the Douglas seam, and after boring 20 inches through it came to a fire-clay, through which they had gone 12 inches when the writer of this letter left on the 20th December. These strata lie at a considerable inclination, and are nearly similar to those which overlies the Douglas coal at Commercial Inlet, which are as follows:—

Conglomerate, 20 feet; siliceous sandstone, 8 feet; shale, 2 feet; alternate layers, shale and sandstone, 14 feet; sandstone, 2 feet; shale, 1 foot 4 inches; sandstone, 2 feet; shale, 4 inches; sandstone, 4 feet. Total: 53 feet 8 inches.

It is therefore probable that the coal which has been reached in the bore will be found to be identical with the Douglas seam, in which case there will be two seams, each of an average depth of 6 feet, overlying each other, at an interval of from 50 to 60 feet. The pit is situated within a few yards of the water-side, and vessels drawing 16 feet water can anchor close to it; the Hudson Bay Company have brought out an excellent engine, by which they raise the coal, and pump out such water as is accumulated in the pit; they are not much troubled with water, and all the pumping that is necessary does not keep the engine going above a quarter of the time.

It is the opinion of the head miner, that coal may be found anywhere, within a circumference of 2 miles from Nanaimo, at a distance of 50 feet below the surface. Altogether there are few places to be met with where coal can be worked as easily and exported as conveniently as from Nanaimo, and it will be the Hudson Bay Company's own fault, if they do not make a very profitable speculation of their possessions there.

Altogether about 2000 tons of coal have as yet been exported from Nanaimo, of which one half may be said to have been worked and loaded by Indians, the other worked by the miners. The first coal exported from the pit was brought by the William to San

Francisco, in May, 1853; it is sold by the Hudson Bay Company at Nanaimo at eleven dollars per ton, the Indian women bringing it alongside the vessels in their canoes. At San Francisco it now (January, 1854) sells at 28 dollars per ton. The greatest objection is that it burns too quickly, and leaves behind a good deal of slag, which makes it difficult to keep the furnaces clean; it is, however, a very strong rich coal, and full of sulphurous matter.

Nanaimo altogether is a flourishing little settlement, with about 125 inhabitants, of whom 37 are working men, the remainder women and children; there are about 24 children at a school presided over by Mr. Baillie. There is good anchorage all over the harbour, which is commodious, and sheltered from all winds; there is a rise and fall of 15 feet at spring tides, and of about 12 feet at ordinary times; it is an excellent place to lay up and repair vessels; the bottom is in general a soft mud. About 24 houses have already been put up by the Hudson Bay Company, and several more are in process of erection. For food they are principally dependant on the Indians, who bring sometimes as many as 63 deer in a day from Schesatl or Jarvis-Inlet, situated a little to the north of Nanaimo, and opposite to it on the main land. The land in the immediate neighbourhood is poor and sandy, but there is a prairie about 2 miles off of some 3 or 4 miles in extent, on which the soil is rich and the surface tolerably level. The Company have claimed 6000 acres, which may be said to include most of the available land in the neighbourhood; all the remainder is covered with timber, and although there is no open land, there may be some 2 or 3 miles of land which is level, between the sea coast and the mountains. At the south west extremity of the harbour, a river flows in; it is about 50 yards wide at the mouth, with an average depth of about 5 feet, and a current of 4 knots per hour. About 7 miles north-west of Nanaimo along the coast, is another excellent harbour, called 'Tutuis,' where also the carboniferous strata prevail, and there is a seam of coal, reported by the Indians to be some 4 feet thick.

South of Nanaimo there are 3 ranges of islands, running parallel with each other, between the mainland of Vancouver Island, and what is generally laid down as such on all charts hitherto published. The channels between these islands are too intricate for a sailing vessel of large size to attempt with any certainty or security. The outer one, between 2 ranges of islands, is probably the best; it expands occasionally into open bays, some 4 miles wide, but is twice contracted into narrow channels, through which the tide runs with frightful velocity. It is quite a mistaken (though general) idea that there is good anchorage throughout these inland passages. I can only say from experience that I found no bottom at 20 fathoms in any part between Nanaimo and

Sanetch. As a general rule, wherever the navigator can see a clay bank on the shore, he may there be certain of finding anchorage ; where the shore is rocky, anchorage is uncertain. The bottom throughout these passages is rocky and uneven, and in the narrows the current sets a vessel towards the rocks, without her helm having any power to guide her away from them.

There is no available land between Nanaimo and Sanetch, a distance of 40 miles ; all the sea-board consists of rocky woodland, and the mountains come down close to the coast ; there are some spots on the opposite islands which might be brought under cultivation, the whole, however, is at present densely covered with timber. Sanetch is a long arm of the sea running inland some 10 or 12 miles ; there is not good anchorage, the water being deep, the arm, however, is perfectly land-locked, sheltered from all winds, and by going close to the shore vessels may anchor in tolerably shallow water. Within 400 yards of the shore in many places there is no bottom at 20 fathoms ; the country all around is densely wooded ; there are 3 or 4 small prairies ; perhaps, taken altogether, some 3 square miles in extent. The savages are numerous, but quiet and peaceable, and any one settling among them would find them very useful. Within an average distance of a mile all round the arm the mountains rise in a perpendicular manner, which quite forbids all hope of a settlement in the interior. At the north of the arm, however, on its northern shore, the Cowitchin River discharges itself. This is the largest river yet known on the island, and flows through a long narrow valley containing a good deal of open land, and a considerable portion of available woodland. About 3 miles up the river there is an extent of some 10 or 12 miles, by perhaps half a mile broad, on either side of rich open alluvial land ; this tract, next to the land at Point Holmes, is the most extensive uninterrupted tract of available open land yet seen on the island. About 20 miles up, the Cowitchin River, in the month of May, is 160 feet wide, and from 3 to 4 feet deep, with current at rate of 3 knots per hour ; there is a little level and some open land occasionally appearing on its banks here ; the soil, however, is poor and useless and overflowed by the water in winter. The river takes its rise from a large lake in the centre of the island, it runs in a south-westerly direction ; the source of it is not many miles from Port St. Juan. From Sanetch, rock and mountain again take up the sea coast until we arrive at Gordon Head, some 15 miles to the south, when the presence of clay cliffs on the beach betokens the probability of some available land existing in the interior : from here to Victoria across the distance is only 6 miles ; round the coast it is considerably longer. In the neighbourhood of Victoria there are altogether about 7 square miles of open land on which the great majority of settlers

above alluded to are located; besides the open land, there may be in the district of Victoria about 10 square miles of available woodland. Victoria itself is situated on a small but well sheltered harbour; the entrance is intricate and the harbour cannot be said to be suitable for large vessels; the village consists of some 60 houses, principally log cabins. Within a pallisaded enclosure are the stores of the Company, and buildings appropriated to the residence of their usual clerks, chief traders, &c. Besides these, their chaplain the Rev. R. J. Staines resides here; in addition to his clerical duties, he and Mrs. Staines keep a school for the education of the children of the officers of the Company; this school is exceedingly well managed, and is calculated to have a most civilizing influence on the future prospects of the island. At Victoria also resides Mr. Douglas, chief factor of the Company, and governor of the island.

About 6 miles westward of Victoria is the harbour of Esquimalt; a safe and commodious harbour for vessels of all sizes, and combining the advantage of sufficient shelter, with that of an open entrance, into which a line-of-battle ship might beat without difficulty.

Between Victoria and Esquimalt may be altogether 200 acres of prairie or open land, on which three bailiffs of the Puget Sound Company are established; they have little or no land under cultivation at present; 25 acres will, I think, cover the total quantity between the three; they have, however, erected good substantial farm-buildings of wood, and probably next year will have brought a good deal more land under cultivation.

There may be about 350 acres of prairie or open land in the neighbourhood of Esquimalt harbour to the westward; all the remaining land between it and Matchousin is woodland, in some places improvable, but generally worthless.

Rounding William Head, where there is a little patch of open land, occasionally browsed on by sheep belonging to the Puget Sound Company, we come, at the distance of five miles westward of Esquimalt, to Matchousin, where we have some 620 acres of fine open land; generally speaking, however, the soil is poor and sandy, and neither produces grasses nor crops with much luxuriance. Matchousin is an open roadstead, sheltered from the north-east, but open to the south and west: there may be about 11 acres now under cultivation in the open land there. At Matchousin is the vestige of some ancient encampment, which an antiquary of enthusiastic imagination might call a very proper agger or vallum, with its corresponding ditch or fossa. The agger is somewhat worn down, but the fossa is clearly discernible some 12 feet in depth and 15 in breadth, extending in an oval form, round three sides of what probably was an intrenched camp, or castra æstiva of the Spaniards;

the fourth side is occupied by a steep clay cliff abutting on the sea beach. The Indians have no tradition concerning it, and not being at a good fishing station, it is more than probable that it was occupied by white men. One or two other such remains of ancient camps exist along the south coast, but we have neither tradition, history, nor internal evidence to guide conjecture as to the original purposes for which they were formed. On leaving Matchousin, dreary rock again becomes the order of the day on the sea coast, and leads us round Albert Head into Pedder Bay, a nice safe little harbour, running about 3 miles inland; at the head of it are two small streams, and just sufficient available open land to swear by. On the west side of Pedder Bay is a fine open prairie extending nearly across to Becher Bay. It contains some 700 acres, and is interspersed with oak trees; the soil is rich and it is well watered, there being several springs throughout it. The land is level, and consists of a rich black mould, some three feet in depth, with a subsoil of yellow clay lying upon mica slate.

Rounding Rocky Point, or Bentinck Island, we come to Becher Bay. This is an open bay, about $2\frac{1}{2}$ miles wide at the entrance, and the same in depth, surrounded by the most hopelessly desolate-looking and useless rock and mountain, which it is possible to imagine. In a small bight at the western extremity, where a little basin of sandstone exists, traces of coal have been discovered and some small pieces of coal found on the surface; no seam of coal has as yet been found; even if it exists at all, its extent must be very limited, and it must be at a very great angle of inclination. An enterprising fisherman from Orkney has established himself here, and last summer put up and exported 300 barrels of salmon, which he had traded from the Indians, and cured himself. This with 150 more barrels traded in the same place by the Honolulu Packet, constitutes all the salmon, the produce of the island, which has hitherto been exported from it. The Company have sent some from San Juan Island; a few hundred barrels, say 300 on an average yearly; and they export 2000 barrels from Frazer River to the Sandwich Islands, but they have not as yet however exported any that I am aware of from Vancouver Island.

In Becher Bay there is a good anchorage in 16 fathoms of water, behind an island opposite the Indian village: shelter may be had there from all winds. Leaving Becher Bay, or as the natives call it Chuchwaetsin, and proceeding along the coast, some 8 miles further to the westward, we come to Soke Harbour, passing meanwhile, as is too frequently the case in Vancouver Island, along the coast of a region, which, if it contain not some unheard-of mineral wealth, is really not worth the ink and paper which it would take to describe it.

On Soke Harbour the author of this paper originally established

himself. He brought about 35 acres under cultivation, raised a small stock of cattle, horses, pigs, and poultry, and built houses for himself and men, with a barn, farm-buildings and a saw-mill. He found the soil produce abundantly, when cultivated, any crops that can be grown in Scotland or England; he found no difficulty in establishing a friendly intercourse with the native tribe of savages, who were only about 60 in number. For two years he resided there, a solitary colonist; he then let his farm on lease to some of the men he had brought out with him, and went to visit a far country. On his return, he found his land thrown out of cultivation, and the greater part of his property destroyed; the remainder he immediately disposed of, and finally abandoned the country.

Soke is as perfectly sheltered a harbour as it is possible to conceive. The entrance is somewhat intricate and vessels will generally have to warp in and out; with a south-west breeze a vessel however can sail in without difficulty. A long sandy spit runs almost completely across the entrance, leaving only an opening of 300 yards; in this are three rocks, which, however, when known are easily avoided; the harbour runs northward for about two miles, with a breadth of about half a mile; it then contracts to a narrow passage, and then bends round to the east, where it expands into an open sheet of water, some 3 miles long by $1\frac{1}{2}$ or 2 broad, with a depth of from 4 to 6 fathoms nearly all over it. There are several shoals in the outer harbour: there is a bar with 20 feet of water running across just outside the entrance, and it can scarcely be said to be adapted to large vessels. The Lord Western, however, drawing 19 feet of water, loaded there last summer without difficulty. The general depth of the harbour is from 5 to 10 fathoms. Along the eastern shore there is little or no available land. At the extremity of the sheet of water above mentioned are the débris of a saw-mill built by the author of this sketch. Following the shore of the harbour we come to no available land until half way to the Indian village, which is situated at the bend above mentioned; round it are a few hundred acres of available woodland. At this point the Soke river discharges itself, which takes its source from two lakes, one about 12 miles in a direct line to the north, the other about 25 miles up; there are a few patches of open meadow-land near the mouth of the River, on which the Indians grow considerable quantities of potatoes. Small canoes can go up the river to a distance of three miles; there is a little level land along it at intervals for that distance, consisting of a rich alluvial soil, covered with a magnificent growth of timber; this land, however, where it exists at all, merely extends for a few yards back from the banks of the river, and beyond the whole country is utterly unavailable. From the mouth of the river all along the west coast of the harbour the

land is rich and level, and though at present covered with woodland, may doubtless some day be brought into cultivation. Near the entrance of the harbour, and running from it, across a small peninsula to the straits, is a small prairie of 315 acres, with an industrious Scotch family, who carry on a little farming, and supply piles and spars to shipping for the San Francisco market. The soil on the prairie is a rich black vegetable mould from 3 to 4 feet deep, with a stiff clay subsoil, resting on sandstone, and the surrounding woodland also consists of very rich soil. The extent of available land, altogether, in the neighbourhood of Soke Harbour, is very limited. Five square miles, of which 330 acres in all are open land and the remainder tolerably level woodland, will certainly comprise the whole. There are about 30 acres under cultivation.

The timber round the harbour is very fine and of several varieties; there are no less than six varieties of fir, and one of pine (*Monticola*), found high up the river; the timber suitable for piles near the harbour is nearly exhausted, a large quantity, however, still remains suitable for spars or square timber.

On leaving Soke, the eye has again to encounter rocky wastes, until after proceeding a distance of some 14 miles westward, where there is a little level woodland along the sea coast. Traces of coal have been found on a small river called by the natives *Quaachuka*, which here discharges itself into the Straits. The sandstone strata prevail along the coast here for some miles, and the quality of the sandstone is precisely similar to that found at Bellingham Bay; the colour is light and it is fine and close-grained; it is interspersed with small seams of coal, few of which are as much as an inch in thickness. Up the river, several detached pieces of coal, or rather of lipute, closely approaching coal, have been found lying on the surface, but the source from which they have come has not yet been discovered. Underneath the sandstone strata is a very remarkable fossil bed, the fossils are large and in perfect preservation, they are imbedded in a strongly indurated reddish clay. Among the fossils are *terebratula reticularis*, *spirifer striatus*, *productus semireticulatus*, and other fossils peculiar to the lower carboniferous strata.

From Soke for a distance of some 45 miles, there is no appearance of open land or prairie, neither with the above exception is there any available woodland, until arriving within 10 miles of Port St Juan, the mountains coming down close to the seashore. Here they trend off a little to the northward, leaving a tract of level woodland, some two miles broad, between their base and the coast.

Port St. Juan is a fine harbour with excellent anchorage of from 3 to 5 fathoms all over it: it is, however, much exposed to the south-

west. It runs about 4 miles inland and would make an excellent fishing station; the fish there being numerous and in great variety. Sturgeon, turbot, salmon, herring, cod, and flounders are caught by the natives. There is good shelter for vessels round a point on the eastern side of the harbour, towards its northern extremity; but there is no prairie land round Port St. Juan. The timber is very fine, and suitable either for piles or spars.

On a raised sea beach, with scant sandy soil, extending with a breadth of from 300 to 500 yards all along the north-east end of the harbour, there is a considerable growth of coarse grass, which would afford good pasture for black cattle.

A fine seam of coal has been discovered between Port St. Juan and Cape Bonilla. It is however almost worthless, as, though it crops out on the sea coast, there is no shelter for vessels near it, and no possibility, except at considerable expense, of making a road between there and Port St. Juan.

At Port St. Juan there is a native population of about 150, called the Patcheena Sinatuch, who are a quiet race, living by fishing, and favourable to intercourse with the whites.

Twenty-five miles westward of Port St. Juan, we round Bonilla Point, and emerge from the Straits of Fuca into the open sea. A strong current sets along the coast in a north-west direction, particularly during winter; so strong is this current that in making the coast in the month of October, the *Lord Western*, a British ship, was in two days carried 43 miles to the westward of where her reckoning placed her. Northward of Point Bonilla, is an inland saltwater loch, to which, however, no passage practicable for vessels exists from the sea; there is merely a narrow, shallow entrance, for canoes and small boats. In the interior it expands some two or three miles in extent, and runs inwards for several miles; from its extremity a passage exists to the Cowitchin Valley to which the savages travel in $1\frac{1}{2}$ days. Round it are settled some 300 savages called the Nitteenatuch or Nitteenats. They are expert whale fishers, and in one season killed as many as 24. There is very little available woodland round this locality and only a small patch of open land extending to some 40 acres.

Fifteen miles northward of Cape Bonilla is Cape Carrasco, the southern point of the entrance to Barclay Sound, a spot concerning which all Indians in general, and Flattery Jack (chief of the Macaws) in particular, seemed to have delighted in telling the most atrocious falsehoods, to the ears of admiring investigators. No white man had visited Barclay Sound subsequent to Meares in the beginning of this century, until the arrival of a small American vessel in the summer of 1852. This vessel in one week loaded with 120 barrels of salmon, which the natives brought alongside in their canoes. On its being visited by the author of this sketch, in

the spring of 1853, in the Honolulu, all accounts of the beautiful prairie-land, with which its shores were said to be adorned, turned out to be entirely fabulous. Suspicions were thrown even on the existence of the Alberni Canal; it is to be hoped, however, for the sake of the good report of the resources of the island, that these latter suspicions may be found by more complete explorers at some subsequent date to be without foundation. One thing is clear, not an iota of confidence is to be placed in Indian reports, whether pro or con.

B Barclay Sound is a broad bay open to the south-west; its breadth at the entrance is about 15 miles and it runs inland with nearly the same breadth to a distance of 17 miles. A number of rocky islets stretch across the entrance; leaving, however, two broad open channels, both towards the south-east side: one of these channels is about $1\frac{1}{2}$ miles broad, it is close to the eastern shore of the sound; the other is about $3\frac{1}{4}$ miles broad, and is a little farther to the north-west; it cannot be mistaken, being clearly visible from the outside, and also distinctly marked by a very singular rock, with only three fir trees on it, appearing precisely like the three masts of a vessel. The channel is immediately to the north of this rock, and the sound is more open after entering within it. There are, however, a few islands interspersed all over it, most of them inhabited by small fishing families of the savages. There is anchorage near all these islets, with good holding-ground, but the water deepens suddenly, and vessels in search of anchorage have to stand very close in-shore. The Honolulu anchored in ten fathoms water within 60 yards of the beach, under the lee of an island called Satchakol, about two miles within the Ship-Rock above mentioned.

On the eastern shore, about 4 miles from the outside, there is a small inlet, called by the natives "Tsuchetsa," with a small tribe living on it; the chief of whom is called "Klayshin." The inlet is about 300 yards broad at its entrance, and branches out into two arms from 70 to 80 yards wide each. The first of these arms extends in an easterly direction for about one mile and a half, sometimes narrowing to a breadth of 40 yards, sometimes expanding to 200, it ends in an open bay 500 yards broad. The land on either side is broken and rocky, though not high; there appears little soil, and the timber is stunted and scrubby. There is no open land either on this or on the other arm, which runs in for about a mile to the south, parallel with the shores of the sound. The land on either side of that arm is level woodland, but the soil is not rich, and the wood worthless, being principally stunted *Canadensis*. The Indians declared that there was no other arm of the sea, running inland from Barclay Sound, and the author approached close to the supposed position of the Alberni Canal, without seeing any signs of such an opening; he was prevented

making a minute examination by darkness coming on, but from what he saw, he believes the allocation of the Alberni Canal to be an error. Generally speaking the country all round Barclay Sound is broken and rocky; thickly covered with useless wood, and unfit for cultivation or settlement. In the country of the Schissatuch, there are some clay cliffs on the coast, similar to those on Puget Sound, but the hills come close down to the water side, and there cannot be a great extent of level country; if there be any at all. There is no truth in reports which have been circulated of there being coal on Barclay Sound; the Indians, however, describe some coal as existing at Munahpah in the country of the Cojuckle-satuch, some three days' journey into the interior, at the back of Barclay Sound. The coal is described as a seam four feet thick, cropping out from the top of a high hill: its position, from the appearance of the country, can scarcely be a place from which it would be possible to export the mineral. The inhabitants of Barclay Sound may be about 700 in all. They are a poor miserable race, are very much divided both into tribes and small families. They are a harmless race, and live altogether by fishing, having few bows and arrows among them, and scarcely any muskets. Even the young men have a singularly old and worn appearance, and they are generally speaking of smaller stature than their neighbours the "Nitteenats." At the back of Barclay Sound, on a small river, about two days' journey into the interior, live the only inland tribe whose existence is known of in Vancouver Island. They are called the "Upatse Satuch," and consist only of four families, the remainder having been killed by the Nanaimo Indians. The inhabitants of Barclay Sound have nothing among them worth trading for, except during the fishing season.

About 7 miles to the south-east of Barclay Sound, and between it and Cape Flattery, is a bay which has never yet been mentioned, called by the natives "Chadukutl." This bay is about 3 miles broad, and runs back a considerable distance. A rocky barrier runs across the entrance, leaving a channel only about 100 yards broad, which no vessel should attempt to enter for the first time without having an Indian pilot. At the upper end of the bay runs in a fine river, about 200 yards broad at the mouth, and there is a frontage of about 3 miles of fine level woodland, running apparently a considerable distance inland. The bay is about 8 miles deep, and its shores are inhabited by one tribe about 400 in number. The natives of Vancouver Island, on the south coast particularly, have a name for every point and promontory; these being the parts which present themselves most prominently to them as they coast along in their canoes. In Soke Harbour every little point to which a white man would not dream of giving a name has its separate appellation, and the names, as in Gaelic,

generally signify something either connected with the face of the country or with the tribe who inhabit it. In this habit of giving names to points, and leaving the indentures of the coast, or bays, without names, these savage aborigines present a remarkable contrast to the Arabs; who travelling on horseback, and by land, take notice principally of the valleys and places where they may procure water, passing the points of land unnoticed. Of this a striking instance may be seen in the nomenclature of the shores of the Dead Sea, where every "Wadi," or valley debouching into the indentations of the shore, has its name; whereas the neighbouring "Ras," or point projecting out into the sea, is often left without a name.

The next harbour north of Barclay Sound is Clayoquot, where there are established 3000 Indians, who are anxious to trade with the whites, but as yet none but Americans have been among them. A bar with from 4 to 6 fathoms on it runs across the entrance to the harbour. There is good anchorage inside, and shelter from all winds; the arm runs a considerable distance into the interior, but there is no open land that I am aware of, and the surface of the woodland is rocky and broken. Clayoquot is distant about 65 miles from Port St. Juan. From this northward to Nootka, there is no land along the sea-board that has the appearance of being available for any useful purpose. Nootka Sound is a large arm of the sea, containing several small sheltered harbours; there is no open land near it, and but little available woodland. The Indians are numerous and sometimes hostile; they seized an American vessel in the summer of 1852, but did not molest the crew.

At Nespod, a little north of Nootka, coal is reported by the Indians. Nespod is called Port Brooks on the charts.

At Koskeemo, north of Nespod, and opposite to Beaver Harbour, a seam of coal, 2 feet in thickness, has also been discovered, but neither from its situation or nature can it be worked to any advantage. There are three arms in Koskeemo, in either of which there is good shelter and anchorage for vessels. Immense quantities of fish are caught here by the Indians. Between Clayoquot and Nootka I omitted to mention Port San Raphael or Achosat, which is a bight of the sea, running inland 3 or 4 miles. There is no available land near it, the water is deep, but close into the inner end there is anchorage near the shore and good shelter.

From Koskeemo round the north to Beaver Harbour there is no land that we are aware of fit for purposes of colonization or settlement, the coast is rocky, though not high, and a vessel would do well to keep clear of it in winter. A very heavy sea is constantly running there, and there is no known harbour to which vessels can put in for shelter.

It will be thus seen that the most favourable places for settlement are to be met with only on the east and south coast; the west coast, north of Barclay Sound, has all a most unfavourable aspect, and even within Barclay Sound we have only Indian reports at present to trust to, for there being land of a nature fit for settlement.

The Indian population of the whole island is stated at 17,000; they are in general favourably disposed towards the whites, and with proper superintendence are capable of being made very useful; they all live by fishing, but take kindly to any kind of rough agricultural employment, though their labour is not generally to be depended on for any continued period.

The lands, at present surveyed by the Hudson Bay Company, are included in a line, which may be taken from Sanetch to Soke Harbours; the quantity of land surveyed in detail is 200 square miles, of which one-third is rock or unavailable, the remainder is principally woodland. The proportion of open land will be seen from the above remarks, where all that is known is mentioned, and bears a very small proportion to the woodland; but where it exists at all it is almost invariably rich; and the woodland, where it is at all level, is richer than the prairie ground, from the increased quantity of vegetable deposit.

5. *Vegetable Productions and Natural History.*

The Flora of Vancouver Island is poor, and no new varieties of plants have been discovered in the country. The open prairie-ground, as well as the patches of soil which are met with in the clefts of the hills, are principally covered with the camass, a small esculent root about the size of an onion, with a light-blue flower, the *Camassia esculenta* of botanists. The camass constitutes a favourite article of food with the savages, and they lay up large quantities of it for winter consumption, burying it in pits in the ground in the same way as they keep potatoes. This root has strong astringent qualities; the savages prepare it for food by digging large holes in the ground, throwing in hot stones, on top of the stones placing quantities of camass, and covering the whole up with sticks and mats until the root is sufficiently baked. The camass digging is a great season of "reunion" for the women of the various tribes, and answers with them to our hay-making or harvest home.

The *Gualtheria shallon*, called by the Canadians "salal," is, next to the camass, the most common plant in Vancouver's Island; it is a small shrub bearing a dark-blue berry, a little larger than the cranberry. The berry is very sweet and wholesome, and the savages are very fond of it; it is called by them *kungcholls*, and it generally grows on dry and poor soil.

The *Arbutus uva ursi* is another plant which abounds on the

low hills, and, as its name implies, together with the salal constitutes a favourite food of the bear; the leaves of it are dried by the natives and smoked in their pipes, mixed with tobacco, when they can get it; the mixture is not unpleasant to smoke, and acts slightly as an opiate.

In the marshy grounds in particular districts is found the *Equisetum hyemale*, or as the Canadians call it, "la Prele." This, in the scarcity of natural grasses, and in the absence of artificial substitutes, forms excellent food for the cattle in winter. They are very fond of it, and will desert their pastures and make paths of several miles through the woods to places where it is to be met with. Several varieties of *Campanula* and *Lupinus* are found in the woods and low grounds, and most fruits generally cultivated in Great Britain abound, both in the low lands and hill sides, wherever they can find any soil to support them. Among these may be mentioned the strawberry, black currant, gooseberry, and raspberry, a small variety of crab apple, and a small black wild cherry. It must not be omitted to mention that the potato is almost universally cultivated by all the savage tribes on the south of Vancouver Island, as well as on the opposite mainland. They have had this valuable root for a long time among them, but as it is never found except among tribes who have been at some time in the habit of trading with the whites, it is most probable that it has been introduced among them by early traders, and that it is not indigenous to the country; the qualities vary according to the nature of the soil; they are, however, generally speaking, of the kinds ordinarily cultivated in Europe, and of these are eight or nine varieties; the root generally is of a larger size than that attained by any potatoes cultivated in Europe. Potatoes and dried salmon form the staple food of all the natives who can procure them, the camass being by them considered more as a delicacy. They consume little animal food, being too lazy to hunt for it, except during winter, when they capture in nets and shoot great quantities of wild-fowl.

Two species of bear are found in the island, the black and brown; such of the natives as have muskets occasionally kill them, and bring their skins for barter to the Hudson's Bay Company; they are numerous in most parts of Vancouver's Island; the flesh of the bear is very coarse, and the foot is the only part of the animal, which, if well cooked, can be eaten with satisfaction by a white man, unless he be very hungry.

Of deer three species are to be met with, the *Cervus elaphus*, or elk, the *Lencurus*, or large white-tailed deer, and a smaller species of black-tailed deer. The flesh of the elk is good nourishing food, that of the other kinds of deer is tasteless and insipid, and contains but little nourishment.

Black and white wolves infest the thick woods, as also a small species of panther, but none of these are very numerous. Squirrels and minxes are found everywhere in great numbers, and both land and sea otters are occasionally to be met with; the latter is only found on the north coast of the island; the animal is generally from 4 to 8 feet long, reaching, however, sometimes to a length of 12 feet, and its fur is very soft and delicate, being by far the most valuable of that of any animal found on the north-west coast; it is generally of a jet black colour, though sometimes it has a slightly brownish tint. Signs of the beaver have occasionally been seen by old trappers on Vancouver Island, but the animal has never actually been met with. Altogether there are very few animals producing valuable furs on Vancouver Island, and I should conceive the value of the furs actually trapped and traded on the island cannot exceed 40*l.* per annum.

Of birds, they have the *Tetrao obscurus*; the male a beautiful bird of bluish colour, rather larger than the Scottish grouse; he has a loose outer throat like that of a turkey, of yellow colour, which he inflates when he utters his peculiar cry. This cry, something like that of an owl, is heard at a long distance; in uttering it while perched on one of the lofty fir-trees of the country, he frequently sounds his death knell, as the creeping savage, lured by the well-known sound, is guided by it, in his approach to his beautiful victim, whom, however, he never attempts to bag unless he sits quietly to receive him: the savage, although he has a very quick eye, never dreams of taking a flying shot at either bird, beast, or man.

Here is also another species of grouse, the *Tetrao Richardsonii*, and the drum partridge completes the varieties of feathered game. The *Obscurus* is found in the highest grounds like the ptarmigan of Scotland; the other two varieties frequent the low woods; none of them are found in numbers and it takes a very good shot, and a still better walker, to make up a game bag of three brace in a day.

Of small birds, there is the Mexican woodpecker, and a large misshapen species of bulfinch—note it has none; and indeed *aves vocales* may generally speaking be said never to be met with on the west coast of America. The settler in these parts misses equally the lively carol of the lark, the sweet cheerful note of the thrush, and the melancholy melody of the nightingale; still more will he of gentle mind, as he wends his solitary way through these distant wilds, feel impelled to hanker after the pleasures of society, and to long for the charm of conversation with the fair daughters of his country.

Of aquatic birds there is a vast variety. They have the Scaup duck, the *Anser Canadensis*, the golden eye, the common mallard, the teal, the crested grebe and numerous others. They completely

cover the lakes and inland salt-water lochs in winter, but altogether leave the country in summer. There is also a large species of crane which frequents the marshes and open ground, and furnishes "material" for capital soup if you can bag him; they are, however, very shy. A sportsman will also occasionally kick up a solitary snipe; these latter are, however, extremely rare and migratory; they are never met with except during a few days in the beginning of February.

There are several varieties of fir in the woods. There are the *Douglasii* (breve braccata) and the *Grandis*, which are the most common; the former furnishes material for excellent spars; the latter is a soft wood, very white, and open in the grain, it is difficult to season it, and, from the irregularity of its growth, is cross-grained, and does not make good timber. The *Canadensis*, the *Mitis*, and the *Alba*, which flourish well wherever there is any depth of soil, all make excellent timber, but are none of them adapted for finishing work. There is also the large red cedar of America, which grows into a noble tree; the *Abies nobilis*, and the *Cupressus thyoides*. The largest and most picturesque tree of the fir tribe in Vancouver Island is the *Nobilis*; it is not, however, often met with; growing only in rich alluvial bottoms, and in no place that I have seen conveniently situated for export. This tree sometimes reaches a height of 250 feet, with a circumference of 42 feet at the butt; the bark is from 8 to 14 inches thick. The white maple grows in all the low woodlands, and is abundant, but never reaches any great size. Wherever there is any open prairie land two kinds of oak, the *Quercus suber clavigata* and another similar species, somewhat darker in the bark and harder in the quality of the wood, are found; the quality of the wood of both these kinds of oak is hard and tough, and they are excellently adapted to form the knees and timbers for vessels; the trees, however, are small and scrubby, and hide their abashed heads before the towering *Coniferæ* by which they are surrounded. A large species of *Arbutus* grows on the sea-coast and on the banks of rivers; it grows to a height of from 30 to 40 feet, the bark is smooth and of a bright-red colour, the wood is hard and white and takes an excellent polish. Only one kind of pine has as yet been found on the island; the *Monticola*. I have only met with it near the source of the Soke River, and there in a position where it never could be made available for either use or export.

The above-mentioned kinds of fir all grow to a great height, from 150 to 200 feet and upwards, wherever the land is at all level, and where there is any depth of soil; generally speaking, however, the quality of the timber of Vancouver Island may be said to be of an inferior description, and, with the exception of the cedar, much more adapted for spars or piles, than for lumber or for any finishing work. To the spectator from the sea-board, the

island appears one mass of wood ; by far the greater portion, however, of that wood which so pleases the distant eye is utterly worthless, as well from its nature as from its position. The trees, chiefly *Abies Douglasii* and *Grandis*, which form so impressing an appearance "en masse," when examined in detail prove to be mere crooked stunted scrubs full of knotty excrescences, and, except in the few lowlands previously mentioned, they grow on the sides and tops of rocky hills, where it is surprising that they can maintain their own footing, and from whence, owing to the singularly broken face of the country, they may wave defiance to the attempts of any engineer to dislodge them.

Among the natural productions of Vancouver Island the native hemp must not be omitted. Specimens have been sent to England, and on its quality being tested it was found to be superior to Russian hemp. There is no great quantity of it growing on the island, it being more properly speaking a natural production of the banks of Frazer River, on the opposite (British) mainland. There is, however, no doubt that it might be very extensively cultivated in Vancouver Island, and in its cultivation is probably the way in which, next to salmon fishing, the labour of the native population might be most profitably employed.

6. *Ethnology.*

The native population of Vancouver Island, which has been roughly estimated at 17,000, is chiefly composed of the following tribes :—

<i>North and East Coasts.</i>		<i>South Coast.</i>		<i>West Coast.</i>	
(In order in which they stand from North to South.)		(In order in which they stand from East to West.)		(In order in which they stand from South to North.)	
Quackolls ..	1500	Tsomass ..	700	Nitteenats	1000
Newittees ..	500	Tsclallums ..	75	Chadukutl	500
Comuxes ..	400	Sokes	60	Oiatuch	100
Yukletas ..	500	Patcheena ..	100	Toquatux	100
Suanaimuchs ..	600	Senatuch ..		Schissatuch	200
Cowitchins ..	3000			Upatesatuch	25
Sanetchs ..	800			Cojuklesatuch ..	150
Other smaller tribes	200			Uqluxlatuch	125
				Clayoquots	3000
				Nootkas	2000
				Nespods	100
				Koskeemos	800
				Other small tribes ..	465
	7500		935		8565

Total 17,000

In the names of these tribes the "ch" is invariably pronounced as by the Scotch.

* Inhabitants of Upatseea, or Barclay Sound.

From the above list it will be seen that by far the most powerful tribes live on the west coast or on the outward sea-board of the island. Of these the Clayoquots are the most numerous and powerful; their sole intercourse with the whites hitherto has been carried on through the medium of Brother Jonathan, who for the last three or four years has been poaching on our preserves, and trading oil and salmon from the natives situated at a distance from British establishments. They (the Clayoquots) are, however, friendly disposed, and profess themselves extremely anxious to traffic with King George instead of with Boston, "which latter," say they, "cheat us amazingly." On a late occasion, when a British vessel, the *Lord Western*, was shipwrecked at Achosat, a little to the north of Clayoquot, the crew were treated in the kindest possible manner by the Clayoquots, who fed and took care of them, until a vessel was sent to their rescue. Of the above-mentioned tribes, the Comux and Yukletah fellows, being savage uncivilized dogs, are the only tribes on the north and east coast, amongst whom a boat's crew of half a dozen white men, if well armed, might not trust themselves alone. On the south coast the tribes are all perfectly friendly, and with the exception of the Patcheena Senatuch accustomed to daily intercourse with the whites. A single armed man may safely go alone among them. On the west coast, a small vessel on a trading expedition has nothing to fear from any tribe but the Nootkas, who are awkward customers and not to be trusted. Not long ago they took possession of a small Yankee vessel, which had gone in there to trade, seized the goods, and made prisoners of the crew, until they were ransomed by the crew of another vessel (also a Yankee) then trading with the Clayoquots. The tribes who have establishments of white men fixed among them are as follows: the Quackolls (Hudson Bay Company coal establishment, at Fort Rupert; which, however, will shortly be abandoned); Suanaimuch (Hudson Bay Company's Nanaimo coal mines); the Tsomass (Hudson Bay Company's factory of Victoria); and the Sokes (small settlement founded by author of this sketch).

The lands of the Sanetch, Tsomass, Tselallum, and Soke tribes have been purchased from them by the Hudson Bay Company in the name of the British Government, leaving to the natives only a few yards of ground reserved around the sites of their villages. The tribes were paid in blankets for their land; generally at the rate of a blanket to each head of a family, and two or three in addition to petty chiefs, according to their authority and importance. The quantities of blankets given to the various tribes were nearly as follows:—to the Tsomass or Sougass 500, to the Sanetch 300, to the Tselallum or Clellum and Sôke Indians together about 150—total 950. The value of the blanket may be about 5*s.* in

England, to which if we add 100 per cent. profit, we have a value of 10s., or two dollars and a half nearly, as the price at which they were sold in the country in 1849-50, when the distribution was made :—1000 blankets at this rate does not seem a large price to pay to the aborigines for some 200 square miles of land, but it was fully an equivalent for what the land was or ever would have been worth to them.

Four distinct languages may be said to prevail among the natives of Vancouver Island, and these four principal languages are divided into a variety of dialects, so that each petty tribe speaks a patois of its own, almost, if not quite unintelligible to its nearest neighbours. From Cape Scott to Johnston Straits the northern or what may be called the Quackoll language prevails; from Johnston Straits to the Sanetch arm the eastern language is spoken, the base of which is the Cowitchin; from Sanetch to Soke, the Tselallum or Clellum language is used with very slight variations, the root of that language being that spoken by the Tselallums or Clellums, whose principal abode is on the American shore opposite to the southern coast of Vancouver Island, from which they probably originally invaded and peopled it; from Patcheena or Port St. Juan again we find another and totally different language, which extends thence with several varieties of dialect all along the western or outward sea-board, as far as Clayoquot; from whence to Cape Scott, a language similar to the Quackoll prevails. These four principal languages, the Quackoll or northern, Cowitchin or eastern, Tselallum or southern, and Macaw or western, are totally distinct from each other, both in sound, formation, and modes of expression. The Cowitchins and Tselallums can, however, understand each other occasionally, though with difficulty; the Macaws and Quackolls can neither understand each other, nor can they make themselves understood by any of the other tribes; the Macaw language is not unlike that spoken by the natives of the Columbia River.

A few of the numerals of the Macaws and Tselallums are sub-joined with a view of showing how totally distinct the languages are from each other.

	1.	2.	3.	4.	5.	6.
Macaw or } Nitteenat }	tsawak	akkle	chee	bo	kukkits	chechpatl
Tselallum	nitsa	chissa	chleuch	enoss	tlkatchis	tchun
	7.	8.	9.	10.	100.	
Nitteenat	atl' o	atlasem	tsawasem	chluch	umbakkuttl	
Tselallum	tsokwas	tats	tukwh	oppen	nazowitch	

The other numerals are formed from these in the Tselallum language; in the Nitteenat, they merely say so many tens, &c., as Xleuchileha, 30; tatsilsha, 80, &c. No affinity has hitherto

been discovered between any of these languages, and any others spoken by the inhabitants of other parts of the world; and besides the languages above mentioned, there are hundreds of other varieties; along the north-west coast of America, every petty tribe generally speaking a dialect altogether peculiar to itself. Their habits, inasmuch as they all exist by fishing and pass the greater portion of their time in canoes, are nearly similar. Nearly all the above-mentioned tribes, as well as all others on the north-west coast, are at variance with each other, and annually indulge in petty wars and predatory expeditions for mutual annoyance, and for the purpose of procuring slaves. Their feuds are chiefly hereditary, but sometimes also spring out from an occurrence of the moment. Sometimes, though not always, two neighbouring tribes have made an alliance offensive and defensive with each other, and keep up their friendly state by annual meetings, and interchange of presents; this circle of amity however seldom extends beyond the two tribes nearest to each other, and sometimes the two nearest tribes are those which are in most deadly hostility to each other.

Slavery is common among all these savages, the prisoners of war being invariably either enslaved or decapitated. Wars however have become much less frequent among them since the arrival of the white man in these parts. Decapitation used previously to be a favourite amusement; they cut off the heads of the prisoners, and placed them on poles as ornaments in front of their villages, where they remained as long as wind and weather permitted. Generally speaking the natives of Vancouver Island, particularly of the southern portion, are by no means courageous: their character may be described as cruel, bloodthirsty, treacherous, and cowardly. They are ready to receive instruction, but are incapable of retaining any fixed idea. Religion they have none; they believe in no future state, neither had they, until some Jesuit missionaries came among them, any idea of a Supreme Being. They are, however, superstitious: they believe in the existence of spirits, and are much addicted to omens. Each tribe has its Tomannoas, or juggler, whose business it is to perform certain incantations when any one of the tribe is taken ill; these principally consist in performing various ridiculous antics, accompanied by singing and howling, not unlike the dancing dervishes of the East; the ceremony is accompanied with much noise, as the beating of boards, the knocking of sticks together. &c. Some of their ceremonies are of a disgusting nature; I think there is no design in any of them, nor anything worthy the inquiry of an ethnologist.

As will be seen from the foregoing list, by far the most numerous tribes are, with the exception of the Cowitchins, those which are situated on the western coast; the western tribes are also the finest

formed and tallest race of men, and as a general rule on both sides of the island, the farther north we go, the finer men we meet with, as well in form as in stature and in intelligence. The stature of the tribes on the south coast is diminutive, varying from 5 feet 3 inches to 5 feet 6 inches. Towards the north of the island among the Clayoquots and Quackolls, men are frequently to be met with of 5 feet 10 inches and over; and still farther north, in Queen Charlotte Island, it is not unusual to see men upwards of 6 feet in height, and stout in proportion. There also savages are to be met with with lightish hair, and when well washed of almost a florid complexion. The colour of the hair of the natives of Vancouver Island is invariably either black or dark brown; it is coarse and straight, and allowed to grow to its full length, falling over the neck, and forming not unfrequently the sole covering to the head of the savage in all weathers. Some few wear a hat shaped like a mushroom, or lampet shell-fish; it is made of twisted cedar bark, or sometimes of hemp. Their features are those which generally characterize the North-American Indian—long nose, high cheek bones, large ugly mouth, very long eyes, and foreheads villanously low. The physical development of the upper part of their bodies is good; they have broad shoulders, and deep well-developed chests. Their limbs are generally small and misshapen, probably from their being constantly in the habit of being so much cramped up in their canoes. Their only general dress is a blanket, made either of a coarse material woven by the women of the tribe from the wool of the white dogs, which are attached to every Indian encampment, and are annually shorn for the purpose, or in some cases it is made of the inner bark of the cedar, torn into small strips and plaited together, and trimmed with the fur of the sea or land otter. Some have no other covering but a bear-skin with their arms thrust through the arms of the skin; all however who can, now clothe themselves in some portion of the European costume; and of it, a shirt is considered quite sufficient to complete the toilette. The women were dressed precisely similar to the men, viz., wrapped in a dirty blanket, with the addition however of a killiccoat suspended from the waist in front, like a Highlander's purse. This garment solely consisted of about seven narrow strips of red or blue cloth, or of cedar bark, about an inch broad, hanging loosely in front to about half way down the thigh, and joined together at the top by a piece of seaweed or of twisted cedar bark, by which they were bound round the waist. Now, both dames and demoiselles have, among most of the tribes, been enabled by trade or otherwise to adopt the chemisette and gown, made of navy blue cotton, in which they look sufficiently hideous objects. The women of Vancouver Island have seldom or ever good features; they are almost invariably pug-nosed; they have however frequently a pleasing expression, and

there is no lack of intelligence in their dark hazel eyes ; they are more apt to receive instruction than the other sex ; they are ready with the needle, naturally industrious in their habits, and of their own accord weave very ingenious patterns from the coarse materials above enumerated ; they perform all the cooking work, and cut up and dry the salmon caught by their savage helpmates ; where there are no slaves in the tribe or family they perform all the drudgery of bringing fire-wood, water &c. ; they take readily to the lighter portion of agricultural labours, in the service of the white man, and I make no doubt that with proper management, under well educated members of their own sex, who would take a pleasure in instructing them, a great and permanent improvement might be effected, both in their physical and in their moral condition.

The colour of the natives of Vancouver Island is a reddish brown, like that of a dirty copper kettle. The features of both sexes are very much disfigured by the singular custom prevalent among them, and among all nations between them and the Columbia, of flattening their heads. This is effected during infancy, when the child is a few weeks old, and while the skull is yet soft, by placing three or four pieces of the inner bark of the fir or cedar on the top of the forehead, and binding them tightly round the head : here they are left until the desired distortion has been thoroughly effected. This process completely flattens the forehead, and indeed flattens the whole front face ; the effect is hideous, and it is a question whether it does or does not interfere with the intellect of the child. I am inclined to think it does not, as the brain is not injured, though its position in the head is undoubtedly altered. This important process once over, an Indian baby is a most independent little fellow, and a happy individual withal, if we may judge by his scarcely ever being heard to cry or sob, or to express his grief in the many ways usually chosen by other mortal babies. Swathed in his covering of soft bark, and bound tightly up in an outer case or hammock of stronger bark, he is suspended by a hempen string to the extremity of one of the lower boughs of an overhanging fir or cedar tree ; and there, while his mother strays to a short distance through the woods in quest of roots or berries, the gentle zephyr rocks him to sleep, and sings to him a sweet lullaby, as it murmurs through the leaves of his natural bower. He is soon able to trot about, and to accompany his heedless parent, either in her woodland rambles, or as she scrambles over the rocks, or wades through the shallow water, seeking for the shell-fish which form a principal article of their food. As soon as able to hold the fish-spear and paddle he has them in his hand, and anon the father becomes his instructor, and teaches him to provide himself with the simple necessities of his life. They have no marriage ceremony, but as

soon as they arrive at the age of puberty, they take unto themselves a wife, if they can afford it, i.e., if their father can buy one for them ; and subsequently they add to this one, an unlimited number, according to the number of their blankets. Polygamy is prevalent ; generally speaking, however, it is only the chiefs of tribes, or heads of families, who have more than one fair one in their harems, and they sometimes have as many as eight or ten. The common men of a tribe, generally speaking, cannot afford to purchase more than one wife, and to her they not unfrequently become attached, from living constantly together, and paddling about in the same canoe, &c. The ordinary price of a wife is ten blankets and a musket ; chief's daughters, however, sell somewhat higher. Frequently little girls of 5 and 6 years old are bought up by intending fathers-in-law for a few beads, and brought up with the tribe into which they are bought, until fit for marriage, and consequently for sale by the old rascal who has bought them, to some of its members, at advanced prices.

All the savages of the north-west coast are great gamblers, and will stake their blankets, their canoes, and even their wives on the hazard of the turning up of one side or other of a piece of cut wood, which is their die. They have several games of chance, and in their natural state gambling may be said to be their prevailing vice. They are not Nomads, but have fixed habitations. Each tribe lives together, within a large palisaded enclosure, formed generally of stakes or young fir-trees, some 12 or 13 feet high, driven into the ground close together. These palisaded enclosures are sometimes 100 feet long by 30 broad, or larger or smaller according to the size of the tribe ; they are generally roofed-in with large slabs of fir or cedar, and in the inside, each family arrange their own mats, whereon to sleep ; these mats are made of cedar bark or of rushes plaited, and when they move on visits, or from one fishing station to another, they pack them in their canoes, and thus carry a complete house, in their own way, about with them ; some of the mats they fix up above them for shelter from the rain, and the remainder they place on the ground under them ; for a short time, these mats form a very good shelter from the weather. Nearly every savage possesses a bow of yew, and arrows tipped with jagged fish-bone ; the use of them, however, has been very generally supplanted among all the tribes by the muskets of the Hudson Bay Company, of which a great number are annually traded, and given as payment for labour. The bows they have are short ; when they fire they hold them horizontally, and they are not generally very expert in the use of this, their natural weapon. Fishing is their principal pastime, as well as their principal means of livelihood, and the salmon season, in the months of August and September, is their great annual jubilee : they catch the salmon

with nets, spears, and hook; the nets are square in shape, and made of the hemp grown on Frazer River; they sink them between two buoys on one side, and their canoe on the other, and placing them in the run of the fish, haul them up suddenly when they see a shoal passing over them. Their spears are of various kinds, the most common is a long stick, split into a fork at the bottom; others they have tipped either with barbed iron, or with jagged fish-bone: which tip being loosely bound on, but fastened otherwise to the shaft by a long string, comes off when a fish is struck, and allows it to play. Their hooks they get from the white man, and their line is made of a long coil of the root of sea-weed, or floating wrack.

In October and November the herrings frequent the bays in great numbers, and are caught by the natives with a long stick with crooked nails on it, with which they literally rake them into their canoes. The herring is precisely similar in quality to that caught on the west coast of Scotland, though somewhat smaller in size. There are seven different kinds of salmon; the general run of their size is about thirty to the barrel; some fish are, however, much larger, and indeed are as fine both in size and in quality as any salmon in the world; they are sometimes caught of a weight of 50 or 60 lbs.

Whales frequent the coasts during the ordinary seasons of bay-whaling in these seas. A few right whales are captured by the natives of the west coast, who attack them in several canoes at once, and tire them out, and so slaughter them, by driving into their bodies, whenever they appear above water, a number of darts with air-bladders attached; they tow the carcasses to the shore, and try out the oil into wooden tubs by means of heated stones. Whales, however, are not found in sufficient numbers on these coasts to induce a regular whaling vessel to come there in quest of them.

Whatever difference there may be in the languages of the various tribes of Vancouver Island, and however great their hostility one towards another, in one characteristic they almost universally agree, and that is, in the general filthiness of their habits. No pigstye could present a more filthy aspect than that afforded by the exterior of an Indian village; they are always situated close to the water-side, either on a harbour, or some sheltered nook of the sea-coast, or, as in the case of the Cowitchins, on the banks of a river; they are generally placed on a high bank so as to be difficult of access to an attacking party, and their position is not unfrequently chosen, whether by chance or from taste, in the most picturesque sites. A few round holes, or sometimes low oblong holes or apertures in the palisades, generally not above three feet high, constitute their means of egress and ingress: they seldom move about much on terra firma, but after creeping out of

their holes at once launch their canoes and embark therein. A pile of cockle-shells, oyster-shells, fish-bones, pieces of putrid meat, old mats, pieces of rag, and dirt and filth of every description, the accumulation of generations, is seen in the front of every village; half-starved curs, cowardly and snappish, prowl about, occasionally howling; and the savage himself, notwithstanding his constant exposure to the weather, is but a moving mass covered with vermin of every description. Generally speaking, when not engaged in fishing, they pass the greater portion of their time in a sort of torpid state, lying inside beside their fires; the only people to be seen outside are a few old women cleaning their wool, or making baskets. Sometimes a group of determined gamblers are visible rattling their sticks, and occasionally some industrious old fellow mending his canoe—all the canoes being invariably hauled up on the beach in front of the village. The firing of a shot, or any unusual sound, will bring the whole crew out to gaze at you; they first wrap their blankets round them, and then sit down on their hunkers in a position peculiar to themselves; they are doubled up into the smallest possible compass, with their chin resting on their knees, and they look precisely like so many frogs crouched on the dunghill aforesaid. Most tribes, besides the main village, which is placed in some sheltered spot, have a fishing village, in a more exposed situation, to which they resort during summer, and the fishing grounds of some tribes extend to a distance of several miles from their fixed habitation. The Tsomass, for instance, have fisheries on Belle-Vue Island, some 15 miles distant from their winter village. And the Cowitchius and Sanetch both have fishing grounds at the mouth of Frazer River, on the opposite side of the Gulf of Georgia. To these fishing stations they emigrate in the salmon season, with their wives and families and all their goods and chattels, leaving their villages tenanted by merely a few old dogs, who fill the air with their doleful ululations, and either live by hunting during their masters' absence, or, as is more frequently the case, die of hunger.

Each tribe has a burying-ground chosen generally on some bare rock vis-à-vis to their villages; thither they carry their dead, and bury them in some square wooden boxes, on the top of which they place large heavy stones; they bury them in the crouched-up sitting posture which they generally occupy during life. A blanket is wrapped round them, and with them are buried all the valuables, bows, arrows, pots, kettles, knives, &c., which they possess while in this world; the boxes which contain the bodies are not imbedded in the ground, but are merely placed on the top of it, or on the rock, as may be, and covered with stones; there is generally some grotesque figure painted on the outside of the box, or roughly sculptured out of wood and placed by the side of it. For

some days after death the relations burn salmon or venison before the tomb: this, say they, is food for their departed brother, who would otherwise feel hunger. This, and the custom of burying the arms and goods of the deceased with him, would imply a belief in some species of future state: one thing is certain, their ideas of a future state are very vague, and they stand in no awe of it. I have stated somewhere above that they believe in no future state, because, notwithstanding some signs to the contrary, several natives of various tribes have expressly told me, as far as their own belief was concerned, that they did not believe in any such state, and that when a man was once killed the sum total of his race was numbered, or, as they expressed it, he was "hoy," i. e. finished. Others again, though comparatively few in number, will tell you, that all the men that a man kills go before him to be his slaves in the next world. The fact is they have no fixed idea on the subject, and each savage starts whatever theory harmonizes best with your manner of questioning him. The analogy which the rudely carved figures by the sides of their sepulchral boxes bear to our sculptured tombstones and monumental brasses, shows how great a similitude exists everywhere in the natural customs of the various races of the great family of man.

Almost the only interesting custom which prevails among the savage races of Vancouver Island is the fasting ceremony which precedes the reception of a youth among the "*εφηβοί*," or warriors of his tribe. For some days previous to this important event, he retires alone among the low hills near the sea-coast, and carries small stones up these hills, which stones he arranges in small circles on the top of them. If this ceremony has any meaning, which I much doubt, no white man has hitherto been able to fathom it. After having remained among the hills as long as hunger will allow him, generally from three to four days, the youth returns to his village, provides himself with a knife, and rushes up and down the village, brandishing the said knife, and wounding with it some of those who come in his way; he works himself up to a state of phrenzy, foams at the mouth, and after a time sinks exhausted. The Tomanous, or medicine-man of the tribe, then takes him in hand, and, after a short series of choral howling and rapping of sticks and paddles together, the youngster is duly declared to be a man and a warrior, and to be fit to take his place at the council fire of his tribe. His father then takes measures to provide him with a wife, and presents him with a toga or blanket, in which he struts about with all the pride of newly acquired dignity. Hitherto his garments have been sufficiently easily supplied; generally, for the first four or five years, no addition is made to the provisions made by nature in that department, except such as smoke and dirt accumulate; by-and-bye a little shred is added from the

skirt probably of the parental garment ; perhaps after this a shirt may be coveted by the youngster, but generally his clothing is somewhat precarious until, as aforesaid, the dignity of the toga is accorded.

The custom alluded to above is evidently merely the shell of some ancient usage, the pith of which has been lost (a fate common to most traditions) by the stupidity or forgetfulness of intermediate generations. The savages are chary of their information on the subject, and make a great secret and mystery of it ; probably, however, as in some more civilized secret associations, there is little more to impart beyond what is generally known.

A remarkable habit prevails among all the natives of Vancouver Island : they will never mention the name of a dead man after he is dead ; they consider it ill-omened to do so—i. e. one of their own tribe : everything that belonged to him also they consider unclean.

On the Columbia River, instead of the boxes above referred to, they use the deceased's canoe as a receptacle for his body in its final mundane resting-place ; these canoes are hung on the trees at certain sites all along the river ; they contain all the deceased warrior's valuables, together with his bow and fish-spear. Rum and the rifle have so well done their work in eradicating the aborigines of Oregon, that these lofty pine trees, with their ill-omened fruit, are now the sole evidence to be met with of the existence of upwards of 100 villages which formerly lined the banks of the Columbia. Two miserable tribes are now the sole occupants of the banks of the river for a distance of 250 miles from its mouth, and these two are now rapidly disappearing from the face of the earth, and making room for its occupation by their white brethren. It appears decreed that the white and red man are never to live in amity together ; the history of the colonization and settlement of every portion of North America is but a continued chronicle of forcible occupations ; it matters little whether the means employed be arms or negotiation, the poor savage is invariably in the end driven out of his patrimony, and the negotiation merely consists in the dictation of certain conditions by the more powerful, which the weaker has no choice but to accept ; and which conditions are violated by the invader whenever it suits his convenience, or whenever he wishes a more extended boundary. Hitherto, in Vancouver Island, the tribes who have principally been in intercourse with the white man, have found it for their interest to keep up that intercourse in amity for the purposes of trade, and the white adventurers have been so few in number, that they have not at all interfered with the ordinary pursuits of the natives. As the Colonial population increases, which, however, it is not likely to do very rapidly under the auspices of the

Hudson Bay Company, the red man will find his fisheries occupied, and his game, on which he depended for subsistence, killed by others: the fisheries will probably cause the first difficulty, as all the tribes are singularly jealous of their fishing privileges, and guard their rights with the strictness of a manorial preserve. Collisions will then doubtless take place, and the T'sclallum and the Cowitchin will be numbered with the bygone braves of the Oneida and the Delaware.

The natural duration of life among the savages is not long, seldom exceeding fifty years; indeed a grey-haired man is very rarely seen; this may be partly accounted for by the horrible custom, universally prevalent, of the sons and relatives killing their parent when he is no longer able to support himself. Sometimes the wretches commit this parricide of their own accord unquestioned, but generally a council is held on the subject, at which the Tomanous or medicine-man presides. Should they decide that the further existence of the old man is not for the benefit of the tribe, the judges at once carry their own sentence into execution, and death is produced by strangulation by means of a cord of hemp or sea-weed. Not less horrible is the custom, very prevalent among the women, of endeavouring to extinguish life in the womb; from this and other causes premature births occur with great frequency. The object of the creatures would seem to be partly to save themselves from the pains of child-birth, and partly to avoid the trouble of bringing up a large family; from whatever reason it may be, the native Indian woman seldom becomes the mother of more than two, and very rarely indeed of more than three, little savages or savagesses, whilst, on the other hand, the half-bred woman is almost invariably extremely prolific.

The union of the white man with the North American savage has seldom if ever been attended with good results; the offspring invariably possess all the faults of the savage, rendered only the more acute by the admixture of some slight additional intelligence from the white parent; the men are passionate and vicious, the women stupid and ill-tempered, and instances are rare of either sex doing justice to the seeds of instruction which are plentifully scattered among them by missionaries of various persuasions.

The savages have a name for every flower, for every tree, and for every herb of the field; even the male and female of various plants are frequently distinguished by them by different denominations: to this knowledge of the names they hold an equally general knowledge of the uses to which the plants may be applied, and this knowledge they make use of not only in healing diseases, but in preparing and administering the most subtle poisons. An obnoxious member of a tribe is frequently carried away by means

of poison, and the employment of such means accords well with the cowardly, but at the same time cruel nature of the savage. Their code of justice is like that current "among them of old time—an eye for an eye and a tooth for a tooth." If blood is shed retribution is quickly called for, but the avenger's arm is speedily stayed by a gift of blankets; indeed, I have known instances where the head of a tribe summoned his band to demand vengeance for a murder committed by a neighbour on one of his humble dependants. The neighbouring chief, intimidated, offered to surrender the murderer to be dealt with as the avenger pleased: but no—that was not what he wanted—he had come expecting to receive blankets as compensation, and blankets he would have. Where, however, one of the chief's own family has been killed it is another affair, and blood must flow to quench the feud: sometimes base blood is accepted, and if so, an additional peace offering must be made. Not long ago the son of the Soke chief stabbed in anger a relative of the chief of the Tselallums of Chuchwaetsin; the man died of the injury, his compatriots made a great clamour, and swore that nothing but the life of the Soke chief and that of his son would satisfy them. Instead of the chief's son, a poor Ukletah slave was accepted as the propitiatory victim, and some canoes and blankets were thrown into the bargain. The miscreants carried their poor victim in triumph to Chuchwaetsin, among shouts and yells and the firing of guns and pistols; arrived at their village, they carried him from their canoe into their pallisaded enclosure, and there they kept him for two days bound on the ground, cramming just sufficient food down his throat to keep him alive. Having sufficiently enjoyed the poor creature's mental torture (for he knew he was to die, and the suspense must have been dreadful), they proceeded to the last act. Two men held him, while another cut his throat over a pail or tub, in which they caught and preserved the blood; the head was then severed from the body, and placed on a pole as an ornament in front of the village; the tragedy thus over, the savage brutes besmeared themselves with the blood of their victim, and conceived that they had done a great action; for some weeks afterwards they were in a great state of excitement, and daily painted themselves with the blood as long as it lasted.

In such transactions as these the real nature of the savage shows itself—experience has proved their nature to be indelible—can it then be wondered at that the civilized nations with whom they have been brought into contact have preferred their extirpation to any amalgamation with such truculent villains?

Amongst the peculiarities of the native tribes of Vancouver Island, it may not be amiss to allude to their national dances, which are of two kinds—one in which the whole tribe join, singing

as they dance, the other in which the performance is confined to two or three chosen individuals: in the former the performers arrange themselves in a circle, in the centre of which one or two foremen stalk by themselves; their business it is to lead the step and the chaunt; their dance is simply a jumping up and down, with both legs from the ground at the same time, which movement they accompany with an incontinent brandishing of arms (for when they dance, like the modern Highlanders, they are generally armed, though sometimes for the arms bunches of feathers are substituted). Sometimes the jumping is dispensed with, and the dance resolves itself into a mere waving of the body to and fro, keeping time to the monotonous chaunt, with which they accompany themselves. There are several various chaunts, but the dancing is in all cases much the same; these chaunts generally consist of five or six bars, varying but slightly from each other, they beat time in the middle of the bar. The chaunts are so arranged as to be made use of as paddle-songs. When in their canoes they sing them frequently, keeping time to them by beating their paddles at each stroke against the sides of their canoes. Melody they have none, there is nothing soft, pleasing, or touching in their airs; they are not, however, without some degree of rude harmony, though it must be confessed that neither the music nor the dancing of these savages hath any charms whatever for the senses of civilized men. The dance and the chaunts are both somewhat similar to those in use among the modern Greeks. When these savages dance they are always painted either with black or vermilion; they do not paint their bodies, but only their faces; the women, besides painting their faces, draw a line of red down the centre of their head, where their hair is parted. Generally both men and women have the centre cartilage of the nose bored through, and a piece of the inside shell of the muscle fixed to it, with a piece of wire or string; the use of ear-rings of the same material is also common among them. Sometimes the women join in the dances, as mentioned above, but more generally they form a separate circle, and chaunt and jump by themselves. The second description of dance referred to is much more interesting. A small screen is hung up across the corner of a mat hut or palisaded enclosure; two fellows get behind it, and emerge on a signal being given by the master of the ceremonies; they are generally youths, they are not armed, but have bunches of feathers in their hands, their hair also being plentifully stuck with feathers, and their faces painted all over. Sometimes they wear a black mask. They first move round each other with a slow movement, something between a step and a crawl, chaunting the meanwhile, and accompanying their chaunt with occasional howls or whoops; the pace then quickens and is diversified by an occasional jump; one party acts the conqueror whilst the other

personates the vanquished, one pursues and the other retreats, the former waving his hands over the latter ; both move round in a circle, and as they occasionally turn and face each other, their movements are not destitute of a certain pantomimic grace. When they have nearly exhausted themselves, the master of the ceremonies, who has also been chaunting all the time, shouts out "Waklay," and the dancers then retire behind their screen to take breath for a fresh performance.

Although blankets now form the current coin among most of the tribes, previous to the advent of the white man they had a certain currency of their own, which currency still exists, and among the remote tribes forms the prevalent mode of exchange. The coins they made use of were the little oblong shells, about an inch long and two lines thick, found in the harbour of Clayoquot, and also in other bays along the north-west coast of the island ; these shells are sometimes made up into belts, sometimes into broad necklaces for the women ; they set a great value on them, and I conceive they are synonymous with the belts of wampum, made use of by the north-eastern and prairie nations.

These customs of presenting belts of wampum in token of friendship, and of electing a certain man in the tribe to the office of Tomanous or juggler, are the only two points of similarity which have occurred to me as existing between the savage of the north-west, and his red brother in the east.

The habit of tatooing the legs and arms is common to all the women of Vancouver Island ; the men do not adopt it.

All attempts to introduce the truths of the Christian religion among these savages have hitherto proved abortive. "Celui qui va planter les semences d'instruction dans le cœur sauvage, a choisi un terrain vraiment stéril," such was the remark made to me by Père Cheroux, a Jesuit priest, and he grounded his remark on reason and experience. The Cluketats, amongst whom his labours were wasted, are one of the most intelligent tribes of Oregon, living on a small tributary of the Columbia ; they have several traditions among them, none, however, of any value to the ethnologist, and they are in the habit of reciting fables, somewhat after the manner of Æsop's fables, of which the following may be taken as a specimen. "A fox, once upon a time, saw a kingfisher skimming over the water, and, ever and anon, barely touching the surface with its wings, and then rising again. I am a stronger animal than that bird, says the fox, and I think I am equally active ; I will, therefore, try whether I cannot perform the same feat. He accordingly takes a run, to give the greater impetus to his spring, and jumps upon the water ; but instead of skimming over the surface, he sinks to the bottom and is drowned." This, say they, is a sign that no one should attempt

an action which he is not qualified to perform. The moral, in short, answers with them to our "ne sutor ultra crepidam."

But to return : all efforts to convert these savages have been in the end unsuccessful. What Elliot and Brainherd could not permanently accomplish, other more recent and equally zealous missionaries have failed to effect ; the savage breast seems incapable of entertaining any fixed idea ; they lend a ready attention in the first instance to the exhortations of the missionary, but, like the seed which fell upon stony ground, it bears no fruit, and all that is learnt is never practised and is very soon forgotten. The efforts of Père Lamfrett, a priest of the order "Des Oblats de Marie," were unceasing ;—at first he was all enthusiasm, "plus que je vois ces sauvages, plus je les aime," said he. The savages were amused with the pictures which he showed them illustrative of Holy Writ, and were somewhat pleased with the sacred songs which he taught them. Some of the Tsomass women learned without much difficulty to chaunt portions of the service of the Catholic Church, and he instituted among them the ceremonies of baptism and of marriage, without at all, however, making them comprehend the true nature of these institutions. When they found there was nothing to be made by their attention to his harangues, their attendance gradually flagged ; and when the fishing season came, all his converts, male and female, evaporated, and preferred the pursuit of salmon to that of religion. On their return, they were more obdurate than ever ; the charm of novelty had disappeared ; disgusted, he declared that they were "gâtés par la compagnie," and determined to try his success among a tribe who had had less intercourse with the white man, and whose souls he fancied would not be so much absorbed in ideas of filthy lucre ; he accordingly shifted his tent from among the Tsomass to the Cowitchins, a powerful nation who had the reputation of being great warriors, and who had very little commerce with the whites. They received him gladly, indeed he went among them at their own invitation, and they came with an escort of 20 canoes to fetch him. At first he progressed wonderfully ; in two days he baptized upwards of 2000 of the tribe, and in a subsequent day he married 700 of them. At the close of the day the worthy Padre's hands were actually tired with the action of sprinkling the holy water. He thought he had discovered a taste for sculpture among them, and, with his religious instructions, he intended to teach them the fine arts, and to have schools which should rival those of Italy ; he also intended to teach them to make bricks, and to cultivate the ground in the European manner. The poor Padre's hopes were, however, raised only to suffer a proportionate downfall ; they listened with avidity only so long as he had a blanket or a fish-hook to give

them ; when his supplies were exhausted, so also was the patience of his hearers ; or, as he himself expressed it in the jargon, "haelo iketa, haelo tilekum," "no goods, no men." As had been the case with the Tsomass, so his Cowitchin converts could not withstand the temptations of the fishing season, and the month of August left him preceptor to only a few old women. Subsequently the Cowitchins, finding that he received no fresh supplies of goods to distribute among them, sent to the neighbouring chief factor of the Hudson Bay Company, to beg that he might be removed or otherwise they would kill him. Thus terminated Père Lamfrett's missionary campaign. He was a man full of zeal for the church, but during the whole time he was among the savages he never succeeded in eradicating any evil custom, or in introducing any new good one. It is true, for a time, he persuaded some of the chiefs who had a plurality of wives, to put away all except one ; he did not succeed, however, in many instances in effecting this at all, and when he did the benefit was questionable. E. g. : Freezy, a chief of the Tsomass, had two wives ; one old and a little *pas-ée*, to whom he had been married several years, and by whom he had a family ; the other young and pretty, and to whom he had only been married a few weeks. On being told by the worthy *Padré* to put away one of his wives, which does he discard ? The latter one, to whom he could not be married, according to the law of the white man, having already been married (by the *Padré*) to the other ? Not a bit of it. He retains his fresh mistress ; and discards his old wife, the partner of his youth and the mother of his family. This is one of the many instances of the want of success of any attempt to cram religion red hot down the throats of the savages.

Some of the wretches will, from the hope of gain, affect an attention to the religion of the Christian, which they do not actually feel ; but I am convinced that no permanent impression has as yet been made on the savages of Vancouver Island, although a bishop of the Catholic Church, and three or four priests, some of them Jesuits, are constantly labouring in the good cause. One of these priests is of opinion that the Cowitchins worship the sun ; I think it however improbable that so grovelling a race should have chosen so noble an object of worship. The contemplation of almost any religious belief tends to expand the mind, and to elevate our nature by fixing a portion of our ideas upon more glorious objects than any contained in this world. Nothing can be more low, grovelling, and brutish than the ordinary ideas of a savage, as far as he gives them expression, they appear to act more from instinct than from reason ; there exists among them no traditional traces of any particular religious belief which has been held by their forefathers ; neither, beyond a few miserable superstitions, and a childish belief

in omens, have I been able to discover any signs of a belief in the interposition or supervision of a higher than mortal power. It will, I think, be conceded as matter of history, that the fruits, if any, of missionary labours in North America have perished with the labourers. If therefore the rapid spread of a doctrine be taken as evidence of the favourable interposition of the Deity in support of that doctrine, it perhaps is not illogical to conclude from the fact, that the blessing of success has not attended the labours of God-fearing, zealous, and intelligent men, in their constant endeavours, during a period of two centuries, to introduce the pure streams of Christian doctrine, amidst the muddy waters of savage unbelief; that, therefore, it may be the will of God, that these savages should remain in their unconverted state.

A nation of men without a religion appears to be an anomaly; still the experience of some years, among the north-western savages, has impressed me with the opinion that these beings have no religion; and that, for some inscrutably wise purpose, the Almighty Ruler of the Universe has decreed that they shall fulfil the daily course of their lives, with the laws of nature for their moral code, and with no higher motive of action than that which is furnished by the impulses of instinct.*

7. *Trade.*

Annexed is a statement of the trade of Vancouver Island during the year 1853. The number and tonnage of vessels is exact; the nature of the cargoes is also minutely specified; the values are a close approximation, if not quite exact. Vessels merely bought up generally sufficient to pay for their cargoes, either in goods or specie. All the trade bona fide with the Island has been between it and San Francisco, the cargoes of salmon exported in the Hudson Bay vessels to the Sandwich Islands having been from Frazer River. The fisheries all along the outer coast of the Island are no doubt excessively valuable; salmon abound in every inlet that I have mentioned, to an extent almost unknown in any other part of the world; herrings, also, are so numerous as to be caught by the natives with a sort of rake or long stick with crooked nails fastened on it. Cod has also been caught at the mouth of the straits and within them; also mackerel on the north of the Island.

There is a cod bank also in the Gulf of Georgia, near Nanaimo; and at Frazer River, in the short space of a fortnight, during August, the Hudson Bay Company put up about 2000 barrels of salt salmon. Hallibut and sturgeon are caught in large quanti-

* See also, 'Incidents of Travel in Vancouver Island;' by Paul Kane, Esq., of Toronto; in the Canadian Journal, July, 1855.—ED.

ties by the natives, both off Cape Flattery and at Port St. Juan. The Sandwich Islands supply markets for fish to a limited extent, but San Francisco and the Spanish Main would consume any quantity that could be sent down to them, and fish in barrels might also profitably be exported to Australia.

The fisheries, coal, and timber undoubtedly form the principal resources of Vancouver Island, as its nature is not at all adapted to pastoral, and not to any extent for agricultural purposes; still a farmer, who thoroughly understood his business, and who possessed within his own family the means of labour, would undoubtedly do well there.

Wheat was selling at three dollars per bushel, butter one dollar per pound, and other produce in proportion. Piles are sold to the shipping at six cents per foot, squared timber at twelve cents; spars also fetch 12 cents without being squared, as they are difficult to get out of the woods.

In the annexed list of imports and exports (pages 312, 313), the cargoes of two vessels of the Hudson Bay Company, arrived from England, the *Norman Morrisson* and the *Otter*, are omitted, their value being unknown to me; as also the cargoes which the *Norman Morrisson* and *Mary Dare* took home to England. What they brought out, however, was principally supplies for their own servants, Victoria being a *dépôt* for all their posts in the interior; and what they exported may be said to have been altogether the produce of these posts, and of the coasting voyages of the steamer *Beaver* along the mainland; they therefore can scarcely be included in the commerce of the Island.

8. *Opposite coast of North America.*

The mainland opposite Vancouver Island is much similar to it in appearance: the general aspect, if anything, is more forbidding. On Frazer River there is a considerable tract of low pasture land on either side, which might be made available for the breeding of cattle. There are some four square miles of open land in the neighbourhood of Fort Langley, which is situated some sixty miles up Frazer River, and there is also a tract of land, a few miles square, in the neighbourhood of Point Roberts, close to the boundary line. Along Thompson River, at a distance of about 200 miles from the sea coast, there is a magnificent extent of pasture land reaching along Thompson River; it may be said to extend from Frazer River to Lake Okanagan, at one of the sources of the Columbia River; this is the only fine tract of land as yet known on the British mainland in these regions. It may comprise some 300 miles, all of it nearly excellent open pasture; there are, however, no means yet known of getting to it, except up Frazer River, and from that up Thompson River. Thompson River

List of Importations and Exportations to and from Vancouver Island, with the Tonnage of the Vessels, and the approximate Value of the Cargo.

Date of Clearance.	Tonnage.	Name of Vessel.	Destination.	Import.	Export.	Value Imported. Dollars.	Value Exported. Dollars.
1853.							
Jan. 2	109	Beaver (Steamer)	Coasting	Specie	Ballast	..	..
" 13	252	Aurelia	Valparaiso	..	Spars (16,000 feet)	1,000	1,500
" 13	92	Honolulu Packet	{Soko and San Francisco}	Merchandise and specie	Timber (2000)	4,500	500
" 14	75	Mary Taylor	Ditto	Ditto	Oysters	1,000	500
" 14	180	Triumph	San Francisco	Ditto	{Cranberries, salmon, lumber, and potatoes}	1,800	2,500
" 15	204	William	Ditto	Ditto	Coals and piles	2,000	1,800
" 15	148	Mary Dare	Nisqually	Cattle and horses	Merchandise	3,000	2,000
" 15	109	Beaver (Steamer)	Frazer River	..	Salt, &c.	1,000	..
" 15	184	Vancouver	Ditto	..	Ballast	..	..
Feb. 17	184	Ditto	Sandwich Isles	..	Salmon	..	13,000
" 28	109	Beaver (Steamer)	{Nanaimo, Vancouver Island}	..	{Merchandise for Hudson Bay Company}	..	..
" 28	45	Alice	Coasting	..	Merchandise	..	..
Mar. 8	109	Beaver (Steamer)	Ditto	..	{Furs and wool for Hudson Bay Company}	..	..
" 16	529	Nornuan Morrisson	London	{Merchandise for Hudson Bay Company}	..	..	..
" 24	109	Beaver (Steamer)	Coasting	..	Merchandise	..	..
" 24	154	Recovery	Ditto	..	{Coal, salmon, and cranberries}	..	4,000
Apr. 9	148	Mary Dare	San Francisco	..	Merchandise	..	..
" 9	75	Mary Taylor	Port Townsend	..	Salmon and oil	1,000	3,000
" 23	75	Ditto	San Francisco	Specie	Squared timber	500	500
" 26	92	Honolulu Packet	Ditto	Ditto	Salt	10,000	1,000
May 17	184	Vancouver	Frazer River	Sugar and salt	Coals and fish	1,500	1,500
June 17	184	Ditto	San Francisco	Specie and merchandise	Piles and squared timber	3,000	1,100
" 17	200	Rose	Ditto	..	Flour	2,000	1,400
" 22	74	Cadboro	Frazer River	Specie and merchandise	Merchandise	2,000	1,000
" 26	250	Joseph Warren	San Francisco	Specie and merchandise	Piles	..	..
" 27	45	Alice	Nisqually	..	Merchandise	..	..
July 4	204	William	San Francisco	Specie and merchandise	..	..	..
" 5	74	Cadboro	Coasting	..	Merchandise	..	..

runs into Frazer River, at a distance of about 200 miles from the sea coast. Along the Gulf of Georgia, opposite Vancouver Island, and within the numerous inlets which exist there, no available land is known. The natives, it is true, report large extents of open mountain pasture in the neighbourhood of Tchesatl or Jarvis Inlet, on which browse numbers of a species of large white goat with short straight horns. The extent of this open country, if it exist at all, must however be very limited, from what we can see of the configuration of the neighbouring country. Jarvis Inlet is situated nearly in latitude $49^{\circ} 50'$ and 50° north.

Between Burrard Canal and Home Sound, *i. e.* on the southern shore of Home Sound close to the entrance, a small seam of coal has been found, lying in sandstone; the sandstone strata are of considerable thickness, the quality of the stone is similar to the sandstone of Bellingham Bay, being hard, white, and close grained. No workable seam has as yet been discovered here, that which was seen having been only a few inches in thickness; it is very probable that further examination may lead to a discovery of the same seam of coal, underlying the superficial strata, as that which is found in Bellingham Bay. The coal-field of Bellingham Bay, which is within the American possessions, being about 20 miles south of the boundary line, is by far the most valuable deposit of coal which has as yet been discovered on the north-west coast; several seams have been seen cropping out of the surface, of a thickness varying from 6 inches to 16 feet: the largest, 16 feet in thickness, is a magnificent seam, the whole of it is sound workable coal even at the surface, and doubtless, as they follow the seam deeper, it will be found to improve in quality. A portion which had been taken from the surface (about 60 tons) had been carried to San Francisco, where it was found to burn well, and to be a strong coal for steam purposes, its power in evaporating water being considerable. This large seam lies between layers of very close grained light coloured sandstone; it crops out on the sea beach, and there is a good anchorage in $3\frac{1}{2}$ and 4 fathoms water close to it. The greatest objection to the working of the seam is the large angle of inclination at which it lies, it being inclined in a south-east direction with a dip of at least 45° . It was first discovered by two workmen who were felling logs for a neighbouring saw-mill. In passing a tree on the side of a bank which had been torn up by the roots, they noticed portions of coal adhering to the roots, and on further examination, under the roots which had been torn up, they found exposed the outcrop of this fine seam several feet in thickness. Being resolved to make the most of their discovery they lost no time in making the particulars public, and sent such glowing descriptions to San Francisco, accompanied by specimens of the coal, that a competition was immediately raised, and a

race ensued between two or three parties, who were anxious to arrive the first in the field. The claim was sold for some 10,000 dollars, but the parties who had bought it, Yankee-like, were merely speculators, and had neither money enough to pay for their purchase, nor to work the mine. Two or three bubble companies have since been formed, none of whom have as yet been able to bring the mine into practical operation.

Another Mining Company, called the Puget Sound Mining Association, was formed to work coal on an adjoining claim: they commenced two or three seams, the largest of which was about 4 feet in thickness; this however also was a bubble company, and from want of funds and of management were unable to carry on their business. They were upwards of four months loading a small brig. Altogether about 140 tons of coal had been exported from Bellingham Bay up to 1st January, 1854.

Bellingham Bay is one of the finest harbours within the Straits of Fuca; it is perfectly sheltered from all winds; there is good anchorage all over it in from 3 to 10 fathoms, and there is ample space to beat in and out.

A small river, called the Summy River, runs into it, up the banks of which there is some little rich alluvial soil thickly wooded. It is probable that the Summy is identical with the Samalkaman River, which takes its source near Lake Okanagan, and passes through a fine prairie country near its source. The land all round Bellingham Bay is poor and sandy; there are two small prairies, about a square mile each in extent, the remainder is thickly wooded with fir and cedar; a few scattered Yankees, about twenty in number, are settled round the bay, and some water-power in the south-east corner has been taken advantage of to put an excellent saw-mill, with two gangs of saws, in operation.

This locality has been mentioned as the probable terminus of the Great Western Railway across the Continent of America; this circumstance and its valuable coal deposits may make it a place of some importance; it is also a good fishing station; the nature of the soil, however, by which it is surrounded, and the very small extent of level land in the neighbourhood, forbid the probability of its ever being a flourishing agricultural settlement.

The American population of the neighbourhood of Admiralty Inlet and Puget Sound altogether is about 600. In the beginning of 1849 there was not a single American settler around the waters of Puget Sound: about that time the American Government sent a Company of Artillery there, to pave the way for settlement, and since then each year has added a few to the numbers of the settlers who flock in, both by the Overland route, across the Rocky Mountains, and also by sea from San Francisco; until now, in 1854, there may be about 600 who have come.

Admiralty Inlet is probably one of the most extensive inland arms of the sea in the world ; from the entrance of the Straits of Fuca, at Cape Classet, it may be said to be one vast sheltered harbour. Admiralty Inlet, however, properly speaking, including Puget Sound, which is at its southern extremity is about 90 miles in length : there is anchorage all over it at a depth of water seldom exceeding 30 fathoms ; there are several small harbours on most of which the Americans have commenced small villages, or as they call them cities ; the largest settlement is Olympia, consisting of log-houses, and containing some 300 inhabitants ; it is situated at the extremity of Puget Sound ; it is not well situated for trade, a large mud flat running out in front of it, which is left high and dry at low water ; no vessel of large draught of water can approach nearer than a distance of at least half a mile. There is but little prairie land in the neighbourhood of Olympia ; the whole probably will not exceed 300 acres.

Next in importance to Olympia comes Steilacoom. This is the locale where the military are stationed, to whom the guardianship of the northern portion of Washington territory is intrusted ; a few straggling log huts have sprung up around those which have been appropriated as barracks ; the soil is poor and shallow, the substratum is a cold clay overlying a mass of shingle several feet in thickness. At the back of Steilacoom is a tract of open prairie or grass land running with little interruption all the way back to the Cowlitz River ; its length may be about 75 miles, with a breadth varying from 1 to 3 miles ; the whole northern portion of it is very poor soil, and indeed is quite useless except for pastoral purposes. Here the Hudson Bay Company had their principal cattle and sheep establishment : their factory is at Nisqually, some 8 miles distant from Steilacoom. In 1849 they had here about 7000 head of cattle and sheep with some 600 horses ; the cattle had principally been driven overland from California, the original sheep had been imported from England, and the horses collected from the various savage tribes of the north-west ; they still keep up their establishment, which is superintended by Doctor Tolmie as well as circumstances will allow ; the Hudson Bay Company have, however, lost a great quantity of stock lately from want of sufficient hands to look after them. Brother Jonathan also takes a stray shot at them occasionally with his rifle, and has appropriated not a few in that and other ways. The wool from the sheep is annually exported to England. The Hudson Bay Company have a few acres of land under cultivation, but it produces little or nothing. The Americans are gradually closing round the Hudson Bay Company, and will no doubt eventually succeed in ousting them from this corner of their territory.

Besides Steilacoom there are two or three little American

villages along the shores of Puget Sound, one of which is called Scatl, another Newmarket: the population of all, including Steilacoom, does not probably exceed 150 souls. The soil all along the shore of Puget Sound is poor and gravelly, and there is little or no open land with the exception of the large prairie above mentioned. The pasturage is of an inferior quality, and altogether its capabilities as an agricultural settlement have been very much overrated.

A considerable trade in piles, squared timber, and lumber, is carried on with San Francisco, and altogether there are 16 saw-mills, steam and water, erected on the sound and its tributaries, including Hood Canal, Port Orchard, &c. There is magnificent water-power on the Nisqually River which Yankee Doodle has not been slow to take advantage of; generally speaking, however, the country is badly supplied with water-power, and indeed, except at Nisqually, at Bellingham Bay, and perhaps on the Sinahomish River, there is scarcely a stream to be met with capable of turning a mill-wheel, which runs all the year round.

Following round the western coast of Admiralty Inlet, we come to the entrance of Hood's Canal, a long inlet running several miles almost parallel with Admiralty Inlet, but diverging a little to the westward; no arable land has as yet been discovered in its neighbourhood; but there are two or three small settlements, and two steam saw mills constantly at work.

Next we come to Port Townsend, a fine harbour, at the entrance of which is another small American village, consisting of some 20 inhabitants. Here the foundation of a customhouse has been laid, and there are some 5 miles of rich prairie land in the neighbourhood. Port Townsend bids fair to be one of the most thriving little towns in the district.

Opposite Port Townsend is Whidbey's Island; an island of some 40 miles in length, by from 1 to 4 in breadth, lying in the centre of Admiralty Inlet nearly north and south; on it some 30 Americans are settled, there is a good deal of open prairie land, and the soil is superior to the generality of what is to be met with on the shores of Puget Sound; it is, however, cold and sandy, and the island is badly supplied with water; there is no good anchorage in any part of it, although vessels may find sheltered anchorages along the coast according to the direction of the wind. There are not above 10 acres under cultivation on Whidbey's Island. How the families settled here manage to exist is a perfect puzzle to an Englishman; indeed the subsistence of the American settlers all along Admiralty Inlet and Puget Sound is sufficiently precarious. Salt pork, salmon, and potatoes form their principal articles of diet. A few barrels of salmon are put up on Whidbey's Island in summer and sent to San Francisco; about 200 barrels are, however,

probably the extent of what has hitherto been exported. A singular phenomenon is to be observed on the western shore of Whidbey's Island: towards the southern extremity, smoke is seen issuing from the ground on the beach in front of a steep clay bank some 150 feet high; on examination all the clay around is found to be baked to the consistency and hardness of a brick and is reddened in colour; the ground for some distance is heated sometimes so as to be unbearable to the touch, at other times only slightly. I conceive that the smoke and heat must be caused by the combustion of some subterranean bed of coal to which water has been introduced. No coal has been discovered on Whidbey's Island; it is probably at some considerable distance under the surface. The shores of Whidbey's Island, as indeed of the whole of Puget Sound and Admiralty Inlet, are lined with the yellowish white clay cliffs peculiar to the country; it is seldom that any rocky substratum is apparent. At Nisqually the bed of coarse shingle which underlies the clay has been bored through to a depth of 150 feet without any rock being found. Sandstone strata occur on the southern coast of the Straits of Fuca, opposite to Vancouver Island, and coal is reported to have been discovered in the Valley de los Angeles on the Elwha River.

It is remarkable that strata of the coal formation, containing fossils precisely similar to those found in Vancouver Island and the opposite prairie land, as *Terebratula reticularis*, *Productus semireticulatus*, and *Spirifer striatus*, have been met with as far south as the latitude of 30°, and about 200 miles to the eastward of the Colorado River.

To return to the coast of Admiralty Inlet, some 10 miles to the north of Port Townsend is Port Discovery; this is another arm of the sea, affording good shelter for shipping; the water is deep and the shores broken and rugged; there is good land in the neighbourhood, and Port Discovery is merely valuable as a timber station; the wood in general is large and lofty, and suitable for masts and spars, as well as for piles and lumber; there are merely a few log huts on Port Discovery, where some ten people are employed with their oxen in hauling out spars and piles for the loading of vessels.

The next settlement we come to is Dungeness, which is nearly opposite to the south-east extremity of Vancouver Island. Dungeness is a roadstead sheltered from the west by a long shingly spit running out some 2 miles. At Dungeness some half dozen American families are congregated. The timber here is very fine; there are some 4 miles of prairie land in the neighbourhood, and there is a considerable extent of level woodland, the soil of which is a rich black vegetable mould. In process of time Dungeness may become a thriving little settlement; it can, how-

ever, never be an important station for shipping, as where there is shelter the water is very shallow, and vessels with a heavy draught of water cannot approach within $1\frac{1}{2}$ miles of the beach.

Between Dungeness and Cape Classet, the white man has not hitherto intruded on his red brother. There are no good harbours along this extent of coast, although there are two or three places, as the False Ness and Clallum Bay, where a vessel might find shelter from the west and south. Neeah Bay close to Cape Classet is the only anchorage worthy the name of a harbour: here a vessel may lie in safety sheltered from almost any winds.

The whole northern coast of Oregon, as far as it abuts on the Straits of Fuca, has an extremely inhospitable look. Snowy mountains, one of which rejoices in the name of Mount Olympus, rear their jagged peaks to a height of some 13,000 feet, and form a sufficiently picturesque coup-d'œil to the spectator as he views them from Vancouver Island. Between these and the sea, low rugged broken hills interpose a barrier to cultivation or settlement; no prairie land is to be met with. On the banks of the Elwha, however (opposite Bentinck Island), a considerable extent of rich alluvial soil thickly covered with woodland gratifies the eye of the explorer, and on some little clear patches there, where the substratum is a rich bluish clay, the natives cultivate the finest potatoes perhaps to be met with in any portion of the north-west coast.

It is said that a pass exists up the Val de los Angeles to the Chihuelas River and Shoalwater Bay, thus communicating with the Columbia Valley. The existence of such a pass is, however, very problematical, and the unbroken contour of the mountains gives no external indication of it.

Explorers in the Elwha country are recommended to be very careful of the natives, and on no account to go alone, or, if in company, unarmed. The author himself once got into serious difficulty with the Elwha tribe, having crossed over from Soke to obtain some of the *Equisetum hyemale*, which grows on the banks of their river, as fodder for his cattle during winter. They are a wild savage race, who are at war with all their neighbours, and not always unsuccessfully, as sundry ghastly trophies in front of their village indicate with horrible distinctness. The Elwhas are probably a branch of the Tselallums or Clellums, indeed they speak the same language.

With the exception of the Elwha country, the whole of the south coast of the Straits of Fuca is inhabited by Clellums, until we come to Neeah Bay, where the country is owned and inhabited by Macaws, who speak a totally different language.

It is a singular fact, that in each different tribe a different

physiognomy is clearly traceable; the difference is slight among neighbouring tribes, and amounts to little more than the various shades in a family likeness; a stranger might pass it over, but it is readily detected by the habitué of the country.

The above hastily written sketch will be found to contain a tolerably exact account of Vancouver Island, &c., as far as it is at present known; the particulars given are all the results of personal observation, and the statistics may be depended on as tolerably accurate, if not precisely correct. It will be seen that Vancouver Island possesses in itself several resources, which, if developed by a free people, under free institutions, would tend to make it a very flourishing colony.

The high price of land, when equally good land can be got for one-fifth of the sum in Oregon, has prevented numbers of people from settling there, who were otherwise favourably inclined to do so.

In the spring of 1851, Mr. Blanchard came out as governor of the island; he remained little more than a year, when he resigned, being in very bad health. His loss was very much to be regretted, as he was a gentleman in every way qualified to fulfil the duties of his position, with credit to himself and with prosperous results to the country over which he was appointed to preside. The present governor has been very successful in his management of the native tribes, whom it is his policy generally to conciliate; on one occasion particularly, when one of the Cowitchin Indians had shot a white man, he thoroughly effected the object in view, that of punishing the guilty for the outrage committed, without causing any unnecessary bloodshed.

A prison also has been built of wood.

The examples of Oregon and of California furnish us with proofs that the rapid growth of new countries is best fostered by giving scope and encouragement to the exertions of individual enterprise, and the progress of a country will be founded on the surest basis when that country shall have been settled by bodies of independent freeholders accustomed to rely on themselves for support, and when the benefit of free institutions shall have given to each individual an interest in the general prosperity.

*XV.—Extracts from Chief-Factor JAMES ANDERSON'S
Arctic Journal.*

Communicated by Sir JOHN RICHARDSON, R.N., M.D., C.B., LL.D., F.R.S.,
Hon. F.R.S. Ed., F.R.G.S., &c.


Read June 22, 1857.

DEAR SIR,—As much reasoning has been founded on the published official report of Mr. Anderson of his search after the remains of the crews of the *Erebus* and *Terror*, I avail myself of the possession of a transcript of his original journal, which he has sent to me, to communicate to you a copy of that part which relates immediately to the search.

Yours faithfully,

To Dr. Norton Shawc, M.D., &c., Sec. R.G.S.

JOHN RICHARDSON.

Monday, 30th July, 1855.—Lake Franklin, to the northward, is covered with ice. The rapids at its outlet were partly passed by a portage and partly run. At their foot were three Esquimaux lodges. An elderly man crossed over, and at first seemed rather timid, but at length disembarked. We made signs that we would cross over, and he then returned. On crossing, we found that besides the man there were three women and ten children; the rest of the party, they made us understand, were absent hunting deer. Large numbers of fresh-water herring and salmon-trout were hung up to dry, as well as some deer's meat. The lodges were made of musk-ox skins, with the hairy side turned inwards. We soon perceived articles belonging to a boat or vessel, such as tent-poles made out of ash-oars, and poles, copper, sheet-iron, and tin kettles and boilers, round as well as of this shape ; a tin soup-tureen, a letter-clip with date 1843, and pieces of boards of elm, oak, white-pine, and mahogany. Some of the boards were painted white; but nothing was found by which any person or vessel could be identified. Printed and manuscript books were shown to the Esquimaux, and we made them understand by signs and words that we would pay handsomely for even a piece of paper: the women were very intelligent, and, I am certain, understood us perfectly; but they said they had none. They made us understand by pressing the abdomen inwards, pointing to the mouth, and shaking their heads piteously, that these things came from a kayack, the people belonging to which had died of starvation. We could do nothing more, and were compelled to leave. The absence of an interpreter is a sad blow to us. The falls below this were run. At the present stage of the water they are only easy rapids. At some distance below we saw two kayacks, which immediately turned and joined three others on

shore. I landed on the opposite shore, and pretended to pay no attention to them. At length, an old man and a young one took courage and crossed: they were evidently much alarmed, but on hearing our cries of Teyma, &c., they came to us. They immediately began to tell us of white men who starved to death, &c. They belonged to the party we saw at the rapids. It was my wish to have taken one of these Esquimaux along with us, but, from the absence of an interpreter, I could not explain my wishes to them, and had I attempted it by signs, they would most probably have become alarmed, and run away. Presents were therefore made to them, and we continued our route. On an island a little below this, the nippers of a pair of smith's tongs were picked up; the handles had been cut off. Weather showery, and wind a-head. About 5 P.M. the rain began to pour down in such torrents that I gave the word to encamp, but no fit place could be found till 7¼ P.M., when we disembarked, thoroughly soaked, on an island near the mouth of the river. No fires could be made; so that pemican and cold water was the order of the day. Some spirits should be allowed for emergencies of this description: the men really require it; and I myself should have no objection at this moment to a glass of brandy and water. A small band of deer and some Canada geese were seen.

Tuesday, 31st, mouth of the Thlewycha.—It was raining so heavily that I did not embark till 5½ A.M. It was still raining then, though not so heavily, and was miserably cold. At 11 A.M. we reached Victoria Headland, when it cleared up partially and enabled us to get some breakfast. We had occasional showers and fog until we reached Cape Beaufort, where we encamped. A few small willows were found at the waterfall at Victoria Headland, and heath* of two kinds, for fuel, in small quantities. No animals were seen to-day except a wolf and two seals: no signs of deer seen. It is a most barren and forbidding coast. A few bands of Canada geese were seen in the evening; also Esquimaux ducks, a loon, and a large gull.

Wednesday, Aug. 1.—From the top of a high mountain I perceived that the inlet to seaward, beyond Montreal Island, is covered apparently with unbroken ice, except a narrow lane of water leading along the eastern shore. Some drift-ice was also seen towards Elliot's Bay. The wind was blowing fresh from the s.w., accompanied by rain. At 2½ P.M. it moderated a little, and enabled us to take the traverse to Montreal Island. We were beset by drift-ice, from 6 to 7 feet thick and quite sound, which came drifting out before the wind and tide at an alarming rate. It was only by the most strenuous exertions, and after many hair-

* *Andromeda tetrajoni* and *Ledum palustre*.—J. R.

breadth escapes, that we succeeded in getting under the lee of Montreal Island. In a few minutes more the entire channel between it and Cape Beaufort was covered with ice. Not a pool of water was to be seen. We are now encamped on the north side of the island, on a rocky promontory which becomes an island at high tide. Saw two seals and a few ducks.

Thursday, 2nd.—After an early breakfast, all hands except one lame man were sent off to explore the island. They were divided into two parties—one going to the right, the other to the left. After making the tour of the island they were directed to spread themselves out and cross it. Mr. Stewart and myself waited some time to hear if the signal (3 shots) of any discovery was made. When we were on the point of departure we heard a signal, and proceeded rapidly towards the spot. Before we reached it we were met by two of the men (Reid and Bouché), who informed us that they had discovered the place where the boat was cut up, and confirmed it by showing pieces of plank, &c., and a chip covered partially with black paint, with the name *Erebus* carved on it. We immediately proceeded to the spot. It is a high rocky ridge on the N.E. extremity of the island. On it were several Esquimaux caches, and among them the spot where it was evident the boat had been cut up. It was strewed with shavings, butts of planks, evidently cut by unskilful hands; small pieces of rope, with the Queen's mark; pieces of bunting, &c. Several of the men having come up, the whole of the caches were opened: in them, besides seal-oil, a variety of blacksmith's tools, a tomahawk, a chain-hook, a piece of a bar of unwrought iron, &c., were discovered, also a bundle of pieces of wood strung together for some purpose; they were of ash, and evidently portions of snow-shoes. On one of them I discovered the name of Mr. Stanley carved, the surgeon of the *Erebus*. Every mound was examined to discover if it were a grave, and the search most zealously carried on till dusk. The only additional things found were some pieces of hoops, parts of instruments, a piece of cane, a piece of the leather of a backgammon board, &c., but not a scrap of paper nor a human bone. The other parties had discovered nothing. On their return ten deer were seen, and five of them shot, all fat bucks. I had promised a reward of 2*l.* to whoever found the first indisputable traces of the missing party, which will now be divided between Bouché and Reid. The day has been a most delightful one. Wind light from N.E.

Friday, 3rd.—Wind, N.E. and N.W., moderate; clear and fine day, but cold. All hands were employed the entire day in search of graves, but without success. Some adjoining islets were then examined by means of the Halkett boat, but only a few trifling articles were found among the caches. Two fat bucks were killed.

Saturday, 4th.—Wind moderate, varying between N.E. and N.W. Clear fine day. As the whole island had been minutely explored, I tried to get over to the western mainland, but found it impossible, owing to the channel being choked with ice. We worked along the western shore until we came to a narrow place for crossing. We must now wait till the ice drives out of the channel. Some Canada geese were seen, and an arctic hare was shot.

Adelaide Peninsula, Sunday, Aug. 5th.—The ice having moved a little, we worked across the channel to the western mainland. The party was then divided into two equal portions; one proceeded to search the coast as far as Elliot's Bay, and the other turned to the northwards. Both parties returned without discovering anything. In the evening we embarked, and proceeded alongshore some distance. The ice alongshore is in moderate-sized blocks, which, when the tide is in, float, and can be pushed apart. New ice was forming when we encamped. Fuel is scarce and bad. The shore is very low, with sandhills inland. The day was fine, though foggy in the morning. Wind light, from N.E.

Monday, 6th.—A beautiful calm day. We have been working in the ice all day, close alongshore. At high tide we get some open water in the bays, and sometimes find channels in the ice. Made one portage. The canoes have received much damage, and are in such a rickety state that we can proceed no farther. The ice is now grounded in such large masses on the shore that the tide does not float them. I have, therefore, determined on taking the Halkett boat, and to explore the remainder of the peninsula on foot. I shall also, if possible, cross over to Point Richardson and examine it: nothing more can be done. Had we had open water, there would have been no difficulty in reaching Cape Herschel, or even farther. While the canoes have been navigated as above described, a land party, accompanied either by Mr. Stewart or myself, has explored the coast minutely. Not a vestige of the missing party has been discovered. The country is composed of ridges of sand and gravel, with occasional swamps and ponds of water, and is dotted with large square blocks of granite, pieces of limestone, &c. No fuel is to be found in the vicinity of the encampment. We are now at Point Pechell. New ice began to form at 4 P.M. About 100 deer, mostly bucks, were seen in the course of the day. Esquimaux ducks, with their young, were seen in the ponds; also loons, laughing-geese and plover, snow-birds, and a few grouse. In the clear sandy bays some white fish* were seen. Not a pool of open water is visible in the inlet; it is as solid as in winter. There is no appearance of decay in the ice, but the rising and falling of the tide has split it

* *Coregonus sapidus*, Agassiz.—J. R.

into fields which form crevasses not exceeding a foot or two in width. Many very ancient Esquimaux encampments were discovered by the land parties in the course of the day.

Tuesday, 7th.—After a very early breakfast, left with Mr. Stewart, and the remainder of the party, except two Iroquois, who were left to gum the canoes and look after the baggage. We were in light marching order. Five men followed all the sinuosities of the coast, while the rest of the party swept the country farther inland. Shortly after leaving the encampment we forded a river: in the spring it must be a considerable stream; I called it *Le Mesurier River*, after a relative of Mr. Stewart's. At first the country was swampy, with innumerable small ponds and occasional ridges, over which were scattered large blocks of granite. The remainder of the peninsula is composed of lofty sand-hills, totally devoid of vegetation, intersected by deep valleys, evidently overflowed at high tides during gales. In one place the water appears at seasons to cut across the peninsula. Several ancient Esquimaux encampments were seen; one more modern one, at Point Ogle, in which a small piece of cod-line and a strip of striped cotton were found. These were the only vestiges of the missing party that were discovered.

The party assembled late, opposite Maconochie's Island. One very fat buck was killed, and most part of it devoured *raw* by the men. After much trouble we managed to make a fire of seaweed, and got a warm supper. The wind was from the N.E., and the day fine. Towards evening it blew fresh, and there being nothing to protect us, not even a hillock, we passed rather a cool night.

Wednesday, 8th.—A piece of open water enabled us to use the Halkett boat. Four of the best men were ferried across early in the morning to examine the island. If they discovered anything they were to make a signal; but not a vestige of anything was found. It was impossible to cross over to Point Richardson as I wished, the ice drifting rapidly between it and Maconochie Island. The wind began to blow a gale from the N.E. and the rain to pour down. I was glad when the party at the island were safely ferried across at 2 P.M.: they had killed a fat buck there. We immediately began to retrace our steps amid the storm. The last of the party only reached the encampment at 11 P.M. We were all miserably wet, and had to crawl under our blankets after a supper of rather ancient pemican and cold water.

It may appear strange to any one unacquainted with this desolate region, that not a vestige of the remains of so large a party as are said to have died here, should have been discovered. I can safely say that the whole coast between Elliot Bay and

Point Ogle, and the country for some distance inland, has been most carefully searched, as well as the whole of Montreal Island, by as keen-eyed and zealous a set of men as exist; still not a human bone has been discovered. My opinion is, that a party of men, suffering from starvation, would have sought out the lowest and most sheltered spots to haul the boat up and encamp. If they died in such a spot, their bodies have doubtless been torn to pieces and scattered about by wild animals, and their bones covered many feet with sand. There are many such spots all along the west coast and on Montreal Island. Any papers would, of course, have been soon destroyed in this climate. Leather-covered books would have been torn to pieces by wolves or foxes. Everything we can do, has been done; and it is evident, from the wretched state of the canoes, that any delay in returning up the river will compromise the safety of the party. There is not the least prospect that the ice in this inlet will break up this season.

Thursday, 9th.—The ground was white with snow this morning, and it had frozen sharply. At 7 A.M. the men began to move the canoes, and we embarked at 9; it turned out a fine day, which enabled us to dry our clothes partially. The ice had been forced ashore since we passed, and we had much trouble in getting through it. A portage was made, and we were fortunate enough to find a kind of canal on the ice, which took us a long piece. With much labour, and additional injury to the canoes, we reached to within 4 miles of our encampment of the 6th. New ice began to form at 4 P.M., and before we encamped it was strong enough to cut the canoes considerably. No deer were seen—*all the tracks go southwards.*

Friday, 10th.—Embarked early. Our progress was very slow, as the blocks of ice were cemented together by the newly-formed ice; I therefore breakfasted early, to allow the sun to soften it. Afterwards we got on a little better. The ice was driving through the strait between Montreal Island and the western mainland. When we reached that spot, the Halkett boat was blown up to visit an island which we could not explore on our way out. Some Esquimaux marks were seen, but nothing more. We then proceeded along the south shore of Montreal Island, which was now nearly clear of ice. The traverse was examined from one of the highest mountains in the island. The wind was from the westward, and a floe of ice appeared to line the eastern shore. I determined, however, to risk the passage. Sail was set and the paddles plied most lustily. On reaching the ice, it proved to be only a long narrow floe, through which we wound our way easily. The wind was now rather close and it blew fresh, but we continued to proceed, and, in fact, we could not have landed had we wished it. We

succeeded at length at 11 P.M. in landing at Point Backhouse. All hands, however, had to jump into the water. It was very cold, and we passed a miserable night in our wet clothes.

Saturday, 11th.—Unable to stir. Raining and blowing a gale from the N.W. by N. The ice drove in again nearly to this point. Had we not crossed yesterday we might have been detained at Montreal Island a long time. Three gaunt wolves approached the canoes so closely last night as to steal some bad pennican which had been thrown away. Four deer were seen.

Sunday, 12th.—Unable to move till midday, when it was still blowing fresh from the N.W., and a heavy sea ran. We shipped much water, but succeeded in reaching our encampment of the 30th ultimo. Raining hard all day, which turned to snow in the evening. It was piercingly cold.

Monday, 13th.—Left at 3 A.M., snowing and raining heavily at intervals throughout the day. Found the Esquimaux at the rapids of Lake Franklin; they were on the eve of departure to hunt deer. All their fish were stored in a neat and substantial stone cache. The whole party now consisted of 5 men, 3 women, and about 12 lads and children. I exposed the contents of the trading cases, and made them understand they were welcome to the whole if they would give us a book or papers. They understood us perfectly, but said they had none, and, to satisfy us, opened up the whole of their caches. Among other articles which we did not see before, were an oval frying-pan, a chisel, a broken hand-saw, a piece of the metal plate of a thermometer, and a piece of an ivory rule. Most of their paddles were made out of ash-oars. They made us comprehend that they had not seen the ships, but had heard from others that they were wrecked, and that the crews were all *dead from starvation*. They gave us boots for nearly all the men, and handsome presents were made in return. Encamped late, below M'Kay's Peak; Mr. Stewart, at the rapid below it, having broken his canoe badly. No animals seen.

Tuesday, 14th—Wednesday, 15th—Thursday, 16th—Friday, 17th—Saturday, 18th—Sunday, 19th.—Journal of these days full of details of the rapids ascended, portages made, and injury received by the canoes. At Lake Garry a cache, which had been made on the downward voyage, was found safe.

Monday, 20th. Lake Pelly.—Heavy rain and strong gale from various points during the night. It was still blowing fresh and raining heavily when we embarked, at 3¼ A.M.; it cleared up partially afterwards. At the rapid between Lakes Pelly and Garry we saw the Esquimaux. The women had run off on seeing us on our way down. The men were now there, and came to meet us unhesitatingly. They possessed various articles used by the Company in their Esquimaux trade, such as files, daggers,

kettles, beads, &c. There were 3 lodges; 2 old men, 1 middle-aged one, and 3 young ones, 3 women, and 6 children. We had seen two of the young men previously at M'Kinlay River, on our way down. We left them after a very friendly interview and giving them handsome presents. There is every appearance of a river falling into a deep bay on the east side of Lake Pelly. The Canada geese migrating to the southward: 25 deer seen going in the same direction.

Tuesday, 21st.—It was miserably cold, blowing fresh and raining when we embarked at 3 A.M. Hoisted sail at Bullen River, and carried it almost half the day. We were much troubled by sand-banks. Picked up our canoe in good order. Saw three lodges of Esquimaux at M'Kinlay River; 10 men, 8 women, and several children were present. The women were all of low stature, with pleasing features. The women are not tattooed till they have had children. Saw several kettles formed of five slabs of sandstone or slate, and cemented with earth or clay at the angles. Saw several of the Company's articles of trade among them. These Esquimaux seem to be a clean, harmless race. They made us understand that they came down M'Kinlay River, though at present it is nearly dry. Made them all handsome presents. The wind headed us in the evening, and it rained incessantly throughout the day. Encamped about a mile below M'Kinlay River. We have found nearly enough of willows for cooking since reaching Lake Garry.

Wednesday, 22nd.—The only good deer passes we have seen are at the rapids between Lakes Pelly and Garry, and at the Hawk Rapids, though doubtless there are others.

XVI.—1. *Account of a recent Visit to the Ancient Tanks of Ceylon, and of an attempt to trace the Course of the Ellahara Canal, &c.*
By SIR HENRY GEORGE WARD, G.C.M.G., &c., Governor of Ceylon.

Communicated by the COLONIAL OFFICE.

Read June 22, 1857.

I HAVE already laid before the Executive Council the results of my observations upon the state of the northern province, and upon the Badulla roads. It remains for me to put into a similar shape the views suggested by my visit to Trincomalie, which occupied me from the 11th February to 3rd March, when I entered the district of Newera Kalawiya. These views will, I hope, be found not undeserving of attention, from their connexion with what I may term the "Tank Question." I mean the question as to the practicability and prudence of attempting to restore the system of artificial irrigation, which, under different circumstances, and in other times, unquestionably gave food and employment to a vast population in parts of the island which are now a desert.

This subject was brought before me at a very early period after my arrival

here, by a Report upon the ancient canal of Ellehara, prepared by Messrs. Churchill, Adams, and Bailey. I have much pleasure in laying before the Executive Council this document, because it does credit to the enterprise, perseverance, and public spirit of the gentlemen who prepared it, and who voluntarily undertook a very laborious duty. It will be found to merit an attentive perusal, for it shows the immense amount of time, science, and combined exertion, that must have been brought to bear upon works of irrigation, at a period when agriculture in Europe was in the rudest and most primitive state. It proves, too, how vain human efforts are to stay the operation of those mightier causes which, though now lost in obscurity, have influenced the march of civilization, and which, so far as we can judge, by altering the course of navigation and trade, must have deprived Ceylon of those local advantages which made her in earlier ages the commercial depôt of the surrounding countries, and thus both created the necessity for those extraordinary works of which we admire the remains, and furnished her with the means of executing them.

For the purpose of these works, in every instance, seems to have been to provide food for a superabundant population. They may have been used, as the Ellehara Canal was, for traffic also. But irrigation was the primary object; and in the neighbourhood of most of the tanks, though the ground is now covered with forest trees, the growth of many centuries, it is easy to trace for miles around the ridges which denote the extent of paddy cultivation that once occupied the space now hid by interminable jungle.

This is not, however, the place or the time to inquire into the causes that led to these revolutions. All that we know positively, or can collect from ancient records, is, that there must once have been a large population congregated upon the western side of the island, in the neighbourhood of Manaar and Aripo; that the causes which prompted the selection of this barren and desolate coast as a commercial emporium probably determined the choice of Anaradhapooru as the seat of government; and this again led to the construction of the Giants' Tank and Padiwel Colum, the most wonderful work that I have yet visited, whether we look to size, difficulties of execution, or to the time at which these were surmounted, the 62nd year of the Christian era; that other causes equally obscure to us forced back this teeming population, leaving everywhere traces of its industry and skill, to the neighbourhood of Pollinarua, where its second capital was founded; that this second capital, like the first, is now a wilderness, and that nothing remains but the long line of tanks, which unite it with Tamblegam Bay and Trincomalie, to bespeak its ancient magnificence.

My object in visiting this scene of past splendour was a practical one. I wished to ascertain the state of the principal tanks, and to form an opinion as to the possibility of turning them to account, in connexion with modern improvements. I was accompanied on my tour by the government agents for the central and eastern provinces, as well as by Captain Sim, R.E., and Mr. Adams, one of the gentlemen who explored the Ellehara Canal, and who took the direction of the party from the time that we left the main road to Trincomalie, which we did 6 miles beyond Dambool, at the Tappal station of Innamalluwe, until we rejoined it again at Kandelly.

Our first day's march from Dambool was to Sigiri, a place too well known to require description.

It is the first and smallest of the line of tanks that fills the space parallel with the road from Innamalluwe to Kandelly. Indeed, as a tank, it hardly deserves to be classed with its neighbours, as it has no artificial supply of water, but simply receives, in a natural hollow, the drainage of the surrounding country, and more particularly of the rock upon which the old fortress of Sigiri stands. From Sigiri to Kondrowawe—the first of the arti-

ficial tanks formed by a regular "bund," or embankment of earth, faced with stone—the distance is about 8 miles. The whole intervening country is jungle, with the exception of a small amount of paddy cultivation in the vicinity of Kondrowawe.

The road is a path of the most rugged character, intersected by roots of trees and masses of rock; and a similar path leads, for another 8 miles, from Kondrowawe to Angoulasse, a deserted village, once probably the centre of a large population, for, before reaching it, we crossed the "bund" of another tank, which, though now buried in jungle, must, from the size of the embankment, and of the stones, with which it is covered, have been of no ordinary dimensions. As we did not reach Angoulasse till dusk, the lateness of the hour prevented closer inquiry.

From Angoulasse to Topari, or Pollinarua, the distance is not above 8 miles, yet even in that space another beautiful tank occurs, which looked more like a natural lake than a piece of artificial water when viewed from the top of the "bund," along which we rode for 25 minutes, shaded by magnificent trees, the size of which bespeaks the antiquity of the embankment on which they stand. This tank is the tank of Dimitelli.

It occupies a plain, opening at one end upon the distant mountains of Matelle, from whence it draws its supplies of water, which are retained on one side by a natural slope, on the other side, and at the end next Topari, by artificial mounds of earth and stone. The embankments are perfect. The sluice, or spill-water, has been replaced by a temporary dam, which is not in good repair, and the leakage may ultimately injure the bund if not attended to. The object of the tank seems to have been the irrigation of the country between Dimitelli and Pollinarua, a space of about 4 miles, which is now a park studded with large trees, but bearing evident marks of ancient cultivation.

There would not, I presume, be any difficulty in restoring this whole district to its original state, if there were men to till the ground, or a market for the produce. The last might be found, in the course of a few years, in the growing demands of the Matelle coffee estates. But the other condition of renewed fertility seems to have disappeared altogether. From Dambool to Topari we did not see a village, and hardly a human creature.

Pollinarua, or Topari, the capital of Ceylon after the abandonment of Anaradhapoora, lies upon the borders of another tank, somewhat inferior in size and beauty to Dimitelli, but filling a large portion of the plain, around which the ancient town was situated. Ruins of temples, and dagobas, and other public edifices, mark its site, and show the great extent of ground which it covered. Many of these are still in a very perfect state. The paths that lead to them, cleared by the temple tenants, and trodden by frequent passengers, show that the place has not yet lost its *prestige*, and that the pilgrims to Dambool often include it in their devotional visits. Still there is an air of desolation in the scene which is very striking. A small village surrounded by magnificent trees, and separated from the lake by the bund, which forms its southern boundary, is now all that remains of human habitation in a place that must formerly have been the abode of many hundreds of thousands of our fellow creatures. Nor do I see what is to restore it.

There is, indeed, waste land in abundance. There is an unlimited supply of water.

But it is difficult to settle a *small* colony in so wild and isolated a position; and I know not from whence the elements of a large colony are to be drawn, especially when there are other tanks, like Minnery and Kandelly, which combine the same natural advantages with the vicinity of a town and a port, from which, if the home market failed, their produce might be exported. As to *small* settlements, the fate of the villages that lingered on after the removal

of the royal residence from Pollinarua, shows how difficult it is, without a certain amount of actual physical force, represented by numbers, to resist the influence of climate, sickness, and isolation. The cholera, or the small-pox, sweeps across a district, and the survivors have neither strength nor courage to continue their usual labours. The clearing of the water-courses is neglected, the dams broken down, the jungle allowed to encroach upon the fields that were once cultivated, the paths that separate the village from its neighbours are overgrown, and, in a very few years, the beasts of the field become the lords of the soil, and set the remnant of its human inhabitants at defiance. The tank districts are full of abandoned villages, of which this is the history; and the most lovely country that I have ever seen, rich in all the elements of successful industry, bids fair to become, before long, the domain of the elephant and the bear, without a single human competitor.

We left Pollinarua on the 17th February, and followed a jungle path for 6 miles, to Giritella Tank, a considerable sheet of water, which appears to be turned to little or no account. The tank was covered with every variety of birds, who were, evidently, seldom disturbed; and the bones of an elephant were whitening upon the grass close to the spot, where the track emerges from the forest. He was killed by the Vidahn of a neighbouring village, the lands of which had often suffered from his inroads.

The village itself is going rapidly to decay, and contains now only five or six families.

From Giritella to Minnery (4 miles) the path lies for 3 miles through thick jungle, and for the last mile through paddy-fields, watered by a stream which flows constantly from the tank, and would irrigate the whole 1000 amunams of land said once to have been under cultivation, but now reduced to 30.

In the evening we visited the lake—a much more appropriate name than tank for so large an expanse of water. It is near 21 miles in circumference, and of peculiar shape, forming bays, where it receives its principal feeders. The bund is, as usual, of enormous solidity.

There is no visible outlet at the point from which the stream that supplies the rice grounds issues. Yet it is perennial; and there can be no doubt that the run of the water is regulated by one of those ancient sluices placed under the bed of the lake, which seem to have answered so admirably the purposes for which they were constructed, though modern engineers cannot explain their action. The embankments are perfect. No symptoms of decay appear anywhere. The supply of water is most abundant, and nothing is wanted but population. From Minnery we went to Kowdella Tank, which is said to have equalled Minnery and Kandelly together in size, but is now in ruins, the waters having burst the bund at a period so distant, that what was once the bed of the tank is now a forest, abounding in trees of the largest dimensions.

The distance from Minnery was variously stated at from 12 miles to 18. I think it 14, having been $3\frac{1}{2}$ hours in doing it. The road through the jungle is good; but when it enters the bed of the tank and passes along the bund, once coated with the stones which are now scattered in irregular masses, or traverses the old rice-grounds which the lake formerly watered, the riding is difficult and even dangerous. The ground, too, had been poached by wild animals when wet, and their tracks were as hard as iron at the time of my visit. It is impossible to imagine anything wilder than the scenery. Herons and bitterns sat like statues on their accustomed perches as our cavalcade passed, so unaccustomed were they to see or fear man. The tank still retains water in many parts, and the magnificence of the vegetation denotes a soil said to be the best in Ceylon for the growth of rice and cotton, which last production, though indigenous, and of excellent quality, has hardly yet attracted the attention of capitalists.

The district appears to have acquired a character for insalubrity when the Trincomalie road was opened, and few have since ventured to establish themselves in it. The village of Polliancadowille, near which we encamped, is small and poor. The population decreases annually by sickness and emigration.

Kandelly, or Gantallawa, as it is more properly called, is the last of this long series of tanks, which, connected as most of them were by the Ellehara Canal, formed what was termed "the Sea of Prakrama."

From its vicinity to the Trincomalie road, Kandelly is better known than any of the other tanks which I have enumerated, and needs less description.

It is a noble sheet of water, at least 16 miles in circumference; formed, as is almost universally the case, by a large embankment, uniting two natural hills, and preventing the water, which flows into the plain, from finding a passage between them.

The distance from Kowdelly is 14 miles, a great part of which consists most unmistakably of ground formerly used for rice cultivation. For 3 or 4 miles the path follows the old post-road to Kandy, and for the last 4 miles before re-entering the high road to Trincomalie, which we did at the 78th milestone from Kandy, we passed along a minor road, cut in a perfectly straight line, until it strikes the main road, 3 miles to the west of Kandelly Rest-house. We rode along the shores of the lake for the last $1\frac{1}{2}$ miles before reaching this.

The embankment is perfect, without breach or flaw of any kind. It is 50 feet high, and 120 feet wide at its base, coated with stone, and overgrown with trees, the roots of which, striking deep into the artificial mound, impart to it additional solidity.

But for all details respecting this interesting tank, I am happy to be enabled to refer to a Report by Captain Sim, R.E. I shall have occasion to advert subsequently to the experiment for which Captain Sim is of opinion that Kandelly presents the most favourable site.

From what I have stated, it appears that, within a space of 60 miles, there are distributed no fewer than nine tanks, constructed with great labour considerable engineering skill, and of such solidity that their embankments seem to defy the hand of time; that, north of these again, about 40 miles, is, Padiwel Colum, the most gigantic work of all, for the bund, which is in perfect repair except at the one spot, where, in the course of ages, the waters have forced a passage between it and the natural hills, which it united, is 11 miles long, 30 feet broad at the summit, 180 feet the base, and 70 feet high; and that to the westward of Padiwel Colum, again, lie the Tank of Anarajapooru and the Giants' Tank, the dimensions of which I cannot give, as the work was never completed according to the original design.*

Padiwel Colum, great part of which I rode or walked over, was formed by the waters of the rivers Morra Oya and Moonganoo Oya, confined to the plain by the enormous bund which I have just described. Its construction must have occupied a million of people for 10 or 15 years.

It was completed by Maha Sen, A.D. 66, and the tank, when full, is said to have irrigated the whole space between the bund and the sea in the direction of Lake Kokolai.

A vast breach is now open, the depth of which is said to be unfathomable; and what was once the basin of the tank is covered with magnificent timber, except in those parts which are still under water during the rainy season.

These are overgrown with a coarse, rank grass. For miles around there

* 1. Sigiri. 2. Kondrowawe. 3. Ruined Tank near Angoulasse. 4. Dimitelli. 5. Pollinarua, or Topari. 6. Giritelle. 7. Minnery. 8. Kowdella (bund destroyed.) 9. Kandelly, or Gantelawe. 10. Padiwel Colum.

is not a vestige of man, and the temporary buildings erected for our reception had the effect of frightening away all the game in the country—so unaccustomed were the deer and buffaloes who frequent the tank to any intrusion upon their solitude.

The number and size of these artificial lakes sufficiently prove the sense entertained of the value of water as the first element of cultivation in a tropical climate by the former possessors of the soil in Ceylon, and the sacrifices to which a whole people submitted in order to secure this blessing, without which they were conscious that their labour must be of little avail. For no wisdom and no power in the ruler can have forced such efforts, even upon the most passive of oriental nations, without a general persuasion that the work was one of paramount necessity, and that all would participate in its benefits. Hence the veneration in which the names of Maha Sen and Prakrama Bahoo are still held, though causes unknown to us—wars, pestilence, or political revolutions—may have laid waste their capitals and driven the population from the neighbourhood of their mighty works into the mountains, where the Portuguese and the Dutch found them.

Can any use be made of these works by us?

The tanks themselves are perfect in all their essential parts. But where shall we find a population to replace that which has disappeared? For five consecutive days I rode through the most lovely country in the world, but in that country one thing was wanting—man!

To talk of tank repairs, or of laying out money in any other way than by bringing a fresh population into contact with the treasures which Nature has lavished upon the soil, would be uncalled for, as well as unprofitable.

Why repair Kowdelly or Padiwel Colum, supposing the attempt to be warranted by the state of the finances, when Kandelly and Minnery are pouring out streams of water that we cannot use for want of hands to till the soil?

We must therefore colonize or do nothing; and when I look to the low rate of wages in the northern province, denoting, as it does, a population much too numerous for the field of employment—when I recollect the annual emigration from the Seven Korles into Nuwera Kalawiya, for the purpose of obtaining ground on which to raise a crop of koorakan, which the dearth of water and the gradual decay of the smaller tanks prevent the people from doing at home—I cannot but think that the experiment might safely and prudently be tried.

I am of opinion that the plan proposed by Captain Sim should be fairly tested. It requires no large outlay. The co-operation of the Government Agent in the northern province would secure applications for land upon some arrangement similar to that suggested. Care must be taken to give a clear title to the land thus brought into cultivation, and to make the terms upon which it is to be occupied thoroughly understood.

There is a large Tamil population at Trincomalie which would facilitate the attempt; and, if a nucleus were once formed, the colony might receive additions from other quarters, and might in the end lead to some larger immigration scheme from the coast of India when people had become aware of the advantages with which successful industry would be attended.

Should a similar disposition be found in the Seven Korles, or in any other Singhalese district, a colony, with its headman, might be located in the neighbourhood of Minnery or Topari upon similar terms, taking care to keep the Singhalese and the Tamils apart.

The experiment is one in which the course to be taken must be determined by circumstances and time; but if the Legislative Council concur with me in thinking that it would be desirable to make the attempt, I invite it to authorise the expenditure of 1000*l.* for this purpose in the estimates for 1857, and I will

pledge myself to spare no pains, so far as the Government is concerned, to bring the matter to a satisfactory issue.

2. Report on the Canal from Ellehara, near Matelle, to Minnery, and thence to Gantalawa, near Trincomalie.



Our attention having, in 1853, been drawn to the remains of an enormous stone bund across the Ambanganga, at Ellehara, in the district of Matelle, we resolved on taking the first opportunity of making a close inspection of it, and of tracing the canal which, according to tradition, was directed from that river into the Gantalawe Tank, near Trincomalie. Circumstances prevented our carrying out our intention until lately, and, having now completed our exploration of this, the most extensive work of irrigation in Ceylon, we are induced to throw the information which we have collected into the form of a Report, for the information of Government, as it may at some future period prove useful.

It is recorded in the native histories of Ceylon that canals were formed, which conveyed the waters of the "Karaganga" to Minnery, and thence to Gantalawe; and these are attributed to king Mahasen, who reigned A.D. 275. Native history also records that Prakrama Bahoo I., who reigned A.D. 1153, diverted the waters of the same "Karaganga" into "the Sea of Prakrama." Local tradition assigns the canal at Ellehara to Mahasen, and the bund across the Ambanganga to Prakrama Bahoo; and Major Forbes, in his work on Ceylon, mentions having procured an inscription from a stone pillar, which, at the time he wrote, existed in the ruins of the bund, "signifying that the canal was completed by the happy, victorious, and illustrious monarch of Ceylon, Prakrama Bahoo."*

Now, as the Ambanganga is the only stream in that part of the country which bears the name of "Ganga," or which deserves to be described as a "river"—as the bund at Ellehara is the greatest work upon it, and as we have ascertained, beyond a doubt, that the canal leading from it conveyed its waters to Minnery, and thence to Gantalawe—these facts, supported by the unvarying tradition existing among the natives of almost every village along its route, seem to us satisfactorily to establish the identity of the "Karaganga" with the Ambanganga; and therefore to prove that the canals leading from it were the works of Mahasen, who, we are told, "formed the great Tank at Minnaria,† and by damming up the Karaganga, turned its stream into it," and "that he cut the Talawatta Ella Canal, by which means he formed 20,000 fields, which he dedicated to the Dehenaka Wihare, whereby the rice grounds got the name of Dantalawe‡ (Gantalawe—Kandaly\$). But the inscription mentioned by Major Forbes, as well as local tradition, ascribe the bund to Prakrama Bahoo, whose reign commenced 852 years after the death of Mahasen. History also records, as we mentioned before, that among the many canals cut by him, "for the purpose of diverting the rivers into the great tanks," he formed "the Goodaaviree Canal, to divert the waters of the Karaganga into the Sea of Prakrama."||

* Forbes' Eleven Years in Ceylon, vol. ii., p. 95.

† Mahasen is still regarded as the Deity of Minnery: his shrine is there, and is regarded as the most sacred in Ceylon.

‡  (an offering)  (a plain.)

§ See 'Tournour's Epitome of the History of Ceylon,' published in the Ceylon Almanac for 1833. Also 'Mahawanse,' p. 237.

|| See 'Tournour's Epitome,' and his 'Notes,' published in the Ceylon Almanac, 1833, on Canals and Water-courses:—"The ambition and vanity of that sovereign

It seems therefore beyond dispute, that the "Sea of Prakrama" was in the neighbourhood of Ellehara, and the remains of the bund across the river, and the vast size of the embankment between that place and Kondrowawe, leave on our minds the conviction that it was formed by the enlargement of the works first executed by Mahasen.

We are led to this conclusion by a careful examination of the gigantic embankments, in parts 80 and 90 feet high, and by as careful a study of the adjacent country as our opportunities permitted. When the whole body of the river was diverted from its course, the waters, receding, must have spread themselves over many miles of flat or imperceptibly rising ground, to the foot of the Kondrowawe range of hills; and nine large streams being turned by the embankment, a series of immense lagoons, extending from Ellehara to Kondrowawe, must have been the consequence.

Reference to the drawing No. 2 will show that, in the first instance, the canal was excavated to a deep pool in the river, and that the bund built by Prakrama Bahoo, probably on the site of the former one by Mahasen, is at a considerable distance below the mouth of the canal, upon a ledge of rock stretching nearly across the river. It is probable, therefore, that Prakrama Bahoo took advantage of the existing works to assist him in carrying out his own project.

The situation of the "Sea of Prakrama" has never, hitherto, been satisfactorily ascertained. Major Forbes indeed surmised that the series of lakes formed by this canal might be "the waters to which the vanity of a king gave his own name;" but he adds "that until this canal shall have been traced through the Kondrowawe hills, the extent and difficulty of such an undertaking must excite doubts whether it were successfully accomplished."*

We have so traced it, and have, we think, proved that Major Forbes' surmises are correct. In no other parts of Ceylon are there the remains of so many, and so extensive, lagoons, so closely adjoining each other. In no part of the island is there, as far as we know, one continuous embankment, extending, without intermission, for 24 miles, and varying from 40 to 90 feet in height.

The "Sea" must have ceased at Kondrowawe, for, from the point where the communication branches off to Minnery and Giritella, the reduced proportions of the embankments, and the altered nature of the country, show that canals only extended to Minnery, Gantalawe, and Giritella.

We began on the 6th ultimo, by examining the commencement of the work at Ellehara, and taking the dimensions of the stone bund.

The Ambanganga is formed by the confluence, at or near the village of Ambene, of four or five considerable streams, taking their sources in the south and west parts of Matelle. Thence it is called the Ambanganga. A range of

[Prakrama Bahoo] made him change their names, giving them the appellations of the great rivers of Dambadiva" [the Continent of India]. For example, the Goodaavairree Canal, from the river Godavery in India.

"At a late Meeting of the Society of Arts, Colonel Cotton, so well known as an advocate for the improvement of Public Works in India, contends, perhaps with a bias in favour of his own opinion, 'that our Indian possessions would be more benefited by Canals for irrigation and navigation, than by great trunk lines of railways. Without a proper supply of water the people are always liable to famines, and the marvellous fertility of the country remains undeveloped.' He 'proposes to improve rivers, to clear out the old canals which have become choked up by long neglect. The region watered by the Godavery alone would produce more cotton than we want.'"

* Forbes, p. 33, vol. ii. We had arrived at the conclusion that the series of lakes thus formed was the Sea of Prakrama, before seeing Major Forbes' remarks; and were surprised at the coincidence, when at Polliuarua we read the passage which we quote above.

hills, commencing from a spur of the Laggalle Mountains, extends in a northerly direction to the left or southern bank of the river, nearly opposite the present village of Ellehara. At a point where this range approaches within a distance of 200 yards from the river, a large embankment of earth, with stone revetments, commences, and extends for about 130 yards, terminating in a wing wall about 15 feet in height. Here begins the large spill-water, the length of which was probably about 90 yards, and from its extremity ran, at an obtuse angle, the great stone bund; this extended across the stream until it joined an immense earth embankment, with stone revetments, averaging 60 feet in height, which still exists, and leads to the mouth of Mahasen Canal.

The remains of the spill-water measure 76 yards in length. This brings us to the edge of the river, and it is evident that it was continued for some 12 or 14 yards further, to the rocky foundation in the bed of the river on which the great stone bund was built. The breadth at the top, at its southern end, is 29 yards, and at the northern end, where it has been carried away, 33. Its height above the level of the water at ordinary seasons is about 40 feet. It is built throughout of huge blocks of hewn stone embedded in chunam, which still remains in the interstices. The stones in the interior of the work were carved with figures, and evidently had formed part of a building of an earlier date. This is also observable at Kalawawe* and Balalawewe, works of irrigation in Nuwerakalawia, and also attributed to Prakrama Bahoo, which seems to prove that the larger works of irrigation in Ceylon are of a comparatively modern date.

Great engineering skill is shown in preparing the rock to receive the foundations of the large stone bund across the river. Upon the outer side these consist of a trench, cut into the solid rock, to receive the first layer of masonry: at a distance of 25 feet inwards is a continuous row of holes, 2 feet square, and about 3 feet apart, and sunk to a depth of about 3 feet; into these were fitted large stone pillars, the remains of some of which, broken short off, are still to be seen: one of them protrudes above the surface of the rock to the height of about 2 feet.

Parallel to this, and at a distance of 10 feet from it, is another row of smaller holes, into which also pillars were fitted to form the inner edge of the masonry. From the angle in the centre of the bund, another row of holes extends, in a semicircular direction, towards the spill-water.

The annexed drawings will better explain what we have thus attempted to describe.

From the northern extremity of the stone bund, and nearly in the same direction, a large earthen embankment, faced with stone revetments, extends as far as the mouth of Mahasen's Canal—a distance of nearly half a mile.

The waters of the river, checked by these vast embankments, must have inundated the low lands lying on either side of the river for a distance of about 10 miles, thus forming the largest of that series of lagoons which doubtless bore the name of the "Sea of Prakrama." As a proof that these low lands were so inundated, gigantic koobooks, trees only growing in or near the immediate neighbourhood of water, are now to be found far above the height to which the river overflows its banks.

At first sight it would appear, that here the river naturally divides into two channels, the one being very much larger than the other; but on closer inspection we have come to the conclusion, that what appears the smaller branch was, in reality, the mouth of Mahasen's Canal, leading into a deep pool in the bed of the river, which, with a bund very much smaller than that of which we

* Dasenkelliya or Dhaatu Sena, probably formed this tank A.D. 459, but Prakrama Bahoo is said to have improved and repaired it.

have described the remains, would have afforded a sufficient supply of water for the purposes for which it is said to have been formed.

Prakrama Bahoo, however, having conceived the idea of forming his 'Sea,' constructed the bund we have described, at a point where he could obtain a good rocky foundation, and could easily connect the high ground on either side of the river. We were led to the conclusion, that what now seems a smaller branch of the river is artificial, and was the excavated mouth of the canal, by the facts of its banks being rocky and precipitous, and very much higher than the land on the south side of the river. This channel, therefore, could not have been formed by the natural course of the water.

At a quarter of a mile from the mouth of the canal the rush of water appears to have breached the bank through which the stream now flows, and joins the river at some distance lower down. There are here some hewn stones scattered about, which are evidence of the remains of the embankment: from this point, therefore, the bed of the canal is quite dry; a very small stream only, in a slightly different direction, being led to the fields now existing at Ellehara.

From the same spur of the Lagalle Mountains, to which we made allusion before, a range of hills extend in a north-easterly direction through Kondrowawe to within half a mile of the Minnery Lake. The Ambanganga, having received the waters of several other streams, intersects these mountains at the village of Ambene, and flows down to Ellehara, a distance of about 14 miles.

To conduct the water of the Ambanganga to Minnery, and to divert the streams falling from this range of hills, this wonderful embankment, which extended, without intermission, for 24 miles, was constructed. Its height, as before mentioned, varies from 40 to 90 feet; but taking its average at 50 feet, it must have contained more than 3,800,000 cubic yards of earth-work, which, with the masonry, would have cost, at the present rate of labour, not less than 200,000*l*. This only includes the works from Ellehara to Kondrowawe. The range of hills to which we have alluded are at some places at a distance of several miles from the embankment, and the ground intervening between it and their base being flat, or rising with an almost imperceptible slope, was submerged. In other places the small spurs of the hills approached so near the embankment as to form a series of canals connecting the lagoons, which the receding hills enclosed. Of these lagoons the largest was that at the stone bund across the river, where the hills form a large amphitheatre; eight others, connected by as many canals, covered the intervening space above the embankment, between Ellehara and Kondrowawe.*

* See Turnour's 'Notes,' Almanac for 1833, page 277:—"Before I make any extracts from that gentleman's interesting Report, I give the following literal translation from the Mahawanse, which contains an account of the principal canals in the reign of Prakrama, in the twelfth century, when they were brought to the highest state of perfection. The ambition and vanity of that sovereign made him change their names, giving them the appellations of the great rivers of Dambadiva, and calling the lake he formed after himself, 'The Sea of Pakrama.' 'The King [Prakrama] formed the deep canal called the Makara Ganga, which flowed from the Makara outlet of the Sea of Prakrama: from the same sea, the great canal Haima Wattee flowing to the Maha-Maigee-Wame. From the outlet called Samanmal, the canal distinguished by the name of Neela-Wapane: flowing from the outlet called the Keela-Kara Oodyaane, the Safalawatte Canal: flowing from the outlet celebrated under the name of Waitra-Watee, the Waitra-Watee Great Canal: from the southern outlet, the Toongha-badra Canal: flowing from the Mangala outlet, the Mangala Ganga Canal: flowing from the eastern outlet, the Champua Canal: flowing from the same sea to the Poornawardhana Tank, the Saraswatee Canal: flowing westward of that (Saraswatee) canal, the Waima-watee Canal.'

"It is nowhere specifically stated in the historical records, that any of these

From the point at which the waters of the river have breached the canal, the embankment continues, about 50 feet high, to the present village of Ellehara. At a distance of about a quarter of a mile from the commencement, advantage has been taken of a flat rock to form a spill-water of about 70 feet wide, with wing walls 15 feet high. This was evidently as a safeguard for the overflow of water in the great lagoon, which, over this spill-water, returned to the river.

Mr. Turnour, in the Ceylon Almanac for 1833, quoting from Mr. Brooke's notes, mentions that "at the commencement of the canal, or about 300 yards from the Ambanganga, a basin has been cut, about 300 to 400 yards in circumference, said to have been excavated when the canal was made, and no doubt was originally a harbour for boats passing up and down." He adds, "it has also had a communication with the canal." We could find no trace of this basin, and think that Mr. Brooke must have mistaken the spill-water which we have described as the communication to which he alludes.

The present village of Ellehara is situated at about two miles from the mouth of the canal; the fields lie below the embankment, and are still cultivated by means of the water of the Ambanganga. Most of the houses, however, are now upon ground formerly part of the site of the great lagoon. A sluice through the embankment still conveys the water to the fields. The name of the village proves that its existence commenced subsequent to the formation of the canal.*

The few houses which yet remain occupied in this once extensive village are wretched to a degree; and from the number of ruined and deserted huts, and traces of sites of former dwellings, there is no doubt that the place was once very flourishing, even when Mr. Brooke passed through it, about 23 years ago. It contained 50 families, which number is now reduced to 10.†

On the 7th, leaving our camp at Ellehara, we set out to commence the exploration of the canal towards Kondrowawe. A road traced towards Batticaloa is cut for 3 miles, at no great distance from the embankment. Two considerable streams, the Kongatoo Oya, and Kirandegalle Ella, which were

canals were navigable, but it is the general opinion of the natives, both of the learned and of those residing in the neighbourhood of these works, who have derived the information entirely from tradition, that the principal canals which received the names of rivers were navigable for canoes as far as Ellehara on the Ambanganga. The Sea of Prakrama with its many outlets as yet unknown or at least unnoticed, whenever it is discovered, will probably be found, like the bed of the Kalawawe tank, a forest in no respect differing from the rest of the wilderness in which it is situated."

The Survey annexed to this Report will shew, that one immense embankment, extending for upwards of 24 miles, forms a series of nine lagoons, connected with each other by nine canals. If Prakrama did change the names of existing canals (for if they had not existed in some degree how could he have changed their names, which, we have Mr. Turnour's authority for stating his ambition and vanity induced him to do?), this alone would account for the difficulty of identifying the "Sea," and seems to confirm the position which we have taken, that Prakrama Bahoo only enlarged and improved upon Mahasen's previous work.

Our inspection of the canal proves, that not only was it navigable for canoes, but for vessels of considerable burthen; and in all the villages through which we passed we found this tradition existing. The tamarind-tree alluded to at page 339 is a remarkable proof of its existence at Ellehara, and the people who pointed out to us the ruins of Mahasen's palace, near the Galoya, on the banks of the canal beyond Minnery, a distance of about 40 miles from Ellehara, described it as his halting place in his voyages up and down the canal.

* පිලිසුනු a canal ගලවනු to turn.

† Mr. Brooke erroneously places Ellehara at a distance of only 9 miles from Nalande. Its distance, however, is about 19 miles.

once checked by the embankment, have breached it; the first about half a mile, and the second at about 2 miles from the village of Ellehara. At about a mile and a half from the last breach stands a gigantic Tamarind tree, on the top of the embankment. This tree, which measures 26 feet 2 inches in circumference, is called the Orubenda Siemalagaha.* Tradition has it, that boats stopping there on their transit up and down the canal, were fastened; and the natives point out some scars near its root, which they say were the marks of chains and ropes.† It is worthy of remark, that there is no other tree near it at all approaching it in size, and it is evidently a tree of very great age. We have found the traditions regarding the canal so consistent throughout, that we cannot help laying some stress on this legend, for we have the most satisfactory proof, from the size of the embankment, that the line from Kondrowawe to Ellehara was navigable. This tree stands at the end of the second large lagoon, and near it are the foundations of some building on the embankment, which was, at this point, about 90 feet high.

In consequence of the high lands approaching the embankment, a canal extends for a mile into the next lagoon, which begins at a spot where the Hirettia Oya enters it, and after flowing along the embankment for a short distance, breaches it, and flows down to the river. About half a mile further on, it is again breached by the Bakamoonoo Ella. From this point, half a mile of canal leads into another large lagoon, along the base of which the embankment extends for two miles, when the natural high land approaches, and forms, with it, a canal, which extends half a mile to the Kottapitiya Oya, which has breached the bank. The lateness of the evening here obliged us to return to Ellehara.

We now found considerable difficulty in obtaining any one who would undertake to guide us to Kondrowawe: for, though many had crossed the embankment at different places, no one had ever gone along it; and the distance and difficulties of the route were greatly exaggerated by the people, from their utter ignorance of it, and their fear that no water might be found by the way. The country between Ellehara and Kondrowawe is now an almost impenetrable jungle, nearly destitute of water, at this, the dry season, with only the site of a deserted village here and there.

Having at length succeeded in obtaining a hunter from Kondrowawe, who undertook to guide us, although he admitted that that part of the country was very imperfectly known to him, we dispatched our large tent, horses, and all the baggage we could spare, by the known road, which is a very circuitous one, to Kondrowawe, and on the morning of the 9th, taking with us only a small tent, supplies for two days, and as much water as we could procure gourds to contain, we started to prosecute our trace as long as daylight lasted. We quickly walked over the ground which we had chained the day before, and recommenced our survey from the Kottapitiya Oya. While breakfasting, we imprudently sent on our guides and catty-men, with a view to expedite our work, and lost some time from having missed our way, the high banks of the Oya misleading us, as they closely resembled the embankment which was hidden from us by the thick jungle, but which, we afterwards found, left the river at a sharp angle. On regaining the embankment, we found that it gradually increased in size till it averaged, for many miles, 80 feet in height. For nearly

* *ඔරුබන්දා සිමලාගාහා* "The tamarind tree to which boats are tied."

† If the wounds penetrated the bark of the tree, which they doubtless did, and reached the wood, Mr. Thwaites, the Superintendent of the Royal Botanical Gardens at Peradenia, informs us, that their marks would never be effaced; and that, were the bark over the wounds removed, it is very probable, notwithstanding the lapse of time since they were inflicted, that traces of the injury to the wood would be visible.

three miles we found it without a breach, and it was evident, from the absence of jungle immediately above it, that in the wet season a considerable quantity of water collects along it. Here the lagoon must have been very extensive, as the base of the hills is four or five miles from the embankment.

A little further on we found it breached, in two places, by a considerable stream, the Keerewanaheena Ella, which rises in the Kondrowawe range. For about three quarters of a mile, a canal connects this lagoon with the adjoining one. Evening was by this time closing in, and as we found that much of our supply of water had been drunk by the coolies to whom it had been intrusted, it became necessary to seek for camping ground at some reasonable distance from a spring. Our guide, who had hunted over this part of the canal, undertook to lead us to a plain about a mile from the Ella, at about 2 miles from which there was a spring. We then sent our coolies to pitch the tent and bring water, while we continued our survey as long as light permitted. We ceased chaining at a large rock spill-water, and it being too dark to take its dimensions then, we were guided to our halting place.

Early on the 10th we returned to the spill-water. We found it a sheet of smooth rock, about 12 feet in height, 110 feet long, and 110 in breadth. At one end of it is a channel cut through the solid rock, 7 feet deep, 6 feet wide, into which sluice gates evidently fitted, for the irrigation of the fields below. Wing walls rose at either end, about 20 feet above the level of the spill-water. Below the spill, and outside the large embankment, is another embankment, of considerable size, which apparently was for the purpose of protecting the fields, immediately below, in great floods, as well as for conveying the water to other parts of the country for the purpose of irrigation. We regret that we had not time to explore this branch, below which, we were informed, lies a vast plain, called Patambegaha Ella Damoonoo, where, doubtless, were formerly the fields irrigated by this sluice.

Opposite to the spill-water, and continuing parallel to the embankment for a considerable distance, we observed, at about 100 feet from it, a small earth bank about 6 feet high, which may either have been intended to regulate the flow of water over the spill, or to confine it in a canal, in the dry season, for the purpose of navigation.

At about 2 miles from the spill-water, the lagoon terminates in a canal, cut through rock, for a distance of about 200 yards, and about 30 feet in width; at the end of which the embankment is again breached by a stream, now called the Attanakade Ella. Two other breaches occur about a mile further on, caused by the Megolle Ella. One of them, probably, is at the spot where the sluice for the irrigation of the fields of the now deserted village of Oulpotegame existed.

The high ground here approaches the embankment, and a canal, for about three quarters of a mile, extends to the site of the deserted village of Talacolepiti, the fields of which were formerly irrigated by the water of Pécolom, a large tank situated about 4 miles west of the embankment. This village was deserted 25 years ago, and a few fields are still cultivated by the people of Kondrowawe, below the great embankment, by the water which escapes from the ruined tank in the rainy season, in a stream called the Radawigi Oya, which has breached the embankment just beyond Talacolepitiya.

We now approached the plains adjoining Kondrowawe, and owing to our guide's ignorance of the country, and the thickness of the jungle, again wandered from the embankment, which however, after some hours' search, we regained, about a mile and a half from the village of Kondrowawe, where we met our people whom we had sent by the road, and breakfasted. Here there is still a considerably larger tank about the embankment and at a higher level than the canal. This apparently was fed both by streams falling from the hills, and from the water of Pécolom tank. It is separated from the canal by

a large embankment. Having ascertained that the spot at which the canal branched off to Minnery and Giritella was 2 miles further on, we proceeded thither, and there encamped for the night.

Between the village and this point, we passed two sluices, long disused, but originally for the purpose of irrigating the numerous fields once existing below the embankment. The first of these penetrated the embankment at a spot where advantage had been taken of a natural rock to form a spill-water, which is singular from the fact of its having two levels. The entire breadth, including both spills, from wing-wall to wing-wall, is 200 feet. The lower spill-water is about 8 feet from the present bed of the canal, and measures in breadth about 50 feet; the level of the higher spill-water is about 10 feet higher, and was 150 in breadth, and through it are two sluices, nearly at the level of the canal, each two feet square. The length was nearly 200 feet. Large waste plains are described as lying below this water, once, doubtless, rich paddy-fields; and the natives described an embankment similar to that which we had observed at the other spill-water. This, however, we had not time to explore.

The second sluice was so dilapidated that we could not distinguish its plan. There was evidently no spill-water here, and the natives could give us no information concerning it.

The direct line of canals and lagoons from Ellehara terminates beyond this sluice, in a stone spill-water, at a short distance above which branch off two canals, the one on the right leading to Giritella Tank, and that to the left said to lead to Minnery. The spill-water at the extremity of the canal consists of a solid mass of masonry, 112 feet in length, and 56 feet in breadth, and like the one which we noticed before is at two different elevations, the lower one having a breadth of 20 feet and the upper of 36 feet. The level of the one is about four feet above that of the other. The masonry of this spill-water is bonded together in a very peculiar manner, combining every possible mode of presenting resistance to the flood of water over it. The inner faces of the embankment here were protected from the action of the water by strong wing-walls.

The distance from the mouth of Mahasen's Canal to the spill-water is about 24 miles.

On the morning of the 11th we sent our tents and people direct to Minnery by the native path, and, having obtained a guide who undertook to bring us by the canal to that place, we proceeded with our survey, preferring the main branch to Minnery to the smaller one to Giritella. After chaining for one mile and a half we found that the direction of this canal bore considerably to the westward; and, after some hesitation, our guides confessed that they had never been there before, and that they now believed that this canal led to Pécolom instead of to Minnery, the only connection with the latter place being, they averred, by means of a sandy stream called the Talawatura, which conveyed the surplus of the great canal over the spill-water.*

As we had sent all our baggage to Minnery, and could form no idea of the distance to Pécolom, we were reluctantly obliged to abandon the exploration of

* Vide 'Turnour's Epitome of the History of Ceylon.'

Mahasen, A.D. 275. Bud: 818.—“He also formed 16 other great tanks and cut the Talawattu Ella canal, by which means he formed 20,000 fields, which he dedicated to the Denanakka Wihare, whence the rice grounds got the name of Dantalawe (Gantalawe or Kandelly).”

We have now ascertained that a canal did exist from Kondrowawe, which conveyed the waters of the Ambanganga into Minnery, whence they were led to Gantalawe. The water which now escapes through the breaches of this canal, as well as that which falls over the spill-water at Kondrowawe, meet and form a stream which now falls into Minnery. This bears the unusual name of Tallawatura. Is it not fair to assume, that this name is but a corruption of Tallawattu Ella?

this canal, resolving, however, to return on the first opportunity and satisfy ourselves as to its direction. We accordingly left the canal by one of its breaches, and following the Talawatura for a considerable distance, reached Minnery Lake through the old tank of Katukaliawe.

Fever, brought on by exposure, compelled us to halt here the whole of the following day, and on the 13th we proceeded, through Giritella, to visit the ruins at Pollinuara. Here we remained for three days, as we were all suffering more or less from fever, and on the 17th we returned, passing through the village of Minnery, and encamped between the outlets of Gantalawe and Kowdella canals. These outlets were for the escape of the surplus water of the Minnery Lake; the lower one, which is called the Mahawana, conveyed the water to the once enormous tank of Kowdella; the upper, or Agalawana, led the water to the Gantalawe or Kandelly tank.

We chose the latter, as it was the principal work, and on the morning of the 18th, under the guidance of an intelligent Weddah, we commenced tracing this canal, the course of which, except for the first three miles, has never before been explored. At the Weddah village of Rotewewa we found the people most primitive. They have been settled here from a very remote period, and said that once they owned all the adjoining lands. This village, and that of Potane, they told us, are presided over by a Weddah chief, who bears the title of the Rangdoon, or the "Golden Bow." Unfortunately for us, this chief was from home on a shooting expedition, and we had not an opportunity of making his acquaintance, but we saw his quiver, full of arrows, which he had left behind.

Leaving our tent and people here, we proceeded to inspect the great breach in the Kowdella tank, which we were informed was only two miles off; the distance, however, turned out to be at least six, the path lying through part of the bed of the tank, now a vast forest. The walk, fatiguing as it was, well repaid us, for nothing could have given us so good an idea of the immense size of the Kowdella tank as the view of this, the principal breach in it. The Gal Oya has breached the embankment of Kowdella, where the river had been dammed across, at a point where two natural hills approached its banks. These are not less than 90 feet above the present level of the water. The breadth of the breach cannot be less than 200 feet at the top; the bottom of the breach is now a large and deep pool of water, in which we saw several huge alligators. We had not time to go on to examine the stone bund, which has already been described by Mr. Bertolacci and Dr. Davy.*

We returned to Rotewewa for breakfast, and afterwards followed the canal for 3 miles further on, where the Gal Oya has breached it. At about a quarter of a mile up the river we found the ruins of a palace, said to have been built by Mahasen, which is now called Nana morella Maligawe, and encamped in a plain adjoining it.

Having now ascertained that the course of the canal from Minnery to Gantalawe lay at a higher level than the Kowdella Tank, and not through it, as supposed by Mr. Turnour,† and having found that the difficulties of proceeding along the bed of the canal were so great as to render it probable that cutting our way through the dense jungle would occupy more of our time than we could spare, we struck from this point on the morning of the 19th to the high road to Trincomalie, which we reached at Gal Oya rest-house.

We continued along the high road towards Gantalawe, and came again upon the canal, where it crosses the road near Kitoolouta, at the point noticed by Lieut. Atcheson.

That officer observes, "About 4 miles from the Tank of Dantalawa or Kan-

* See Ceylon Almanac for 1833, App. p. 275.

† See extract from Mr. Turnour in Mr. Brooke's Journal, p. 57.

dalla, the road crosses a canal from 20 to 30 feet broad, formed by an immense embankment thrown up on the lower side. This canal is said to be supplied by the waters of the Ambanganga, that river being dammed up and turned into this channel at Ellehara, feeding the tanks of Minnery and Kowdella in its course to Dantalawa." (See Ceylon Almanac for 1833, p. 281.)

The tradition of the origin of this canal was correctly given to Lieut. Atcheson, but he seems to have fallen into the same mistake as Mr. Turnour, in supposing that it passed through Kowdella tank in its way to Gantalawe.

We continued our journey to Kandelly, but found that there the tradition had become very faint and vague, in consequence of a Malabar population having superseded the Singhalese. The following morning we went to the tank, but as our time was too limited to admit of a lengthened search, and in the absence of native information to guide us, we could not ascertain, with any degree of certainty, the point at which the canal enters it. An old man, almost the only one who appeared to have ever heard of the canal, pointed out to us a sandy river, which, he said, he always understood was the point where the canal came in, and near it we thought we could trace the remains of an embankment.

We do not, however, regard our failure at this point as a matter of any importance, as the existence of a range of hills on the western side of the road, extending from the place at which the canal crosses it to the tank, renders it impossible that it could have led anywhere else than to Kandelly. We were informed by the villagers that an embankment exists leading from Gantalawe tank to Indiriweve, a tank a short distance from the north.

We now returned to Gal Oya, and determined to complete the link between Kondrowawe and Minnery, which we had lost by the misrepresentations of the people of the former place. We proceeded through Seegiri to Pécolom. To judge by its embankment, which is the largest we have seen, Pécolom must have been one of the most considerable tanks in this neighbourhood, inferior only to Minnery and Kowdella. The revetments were continued nearly to the top of its embankment, proving that its depth must have been very great. We ascertained that this tank was filled by the Kiri-Oya, a large stream almost deserving the name of a river, which rises in Nuweregalla Kandy, in the north-east part of Matelle, and is divided from the Ambanganga by the Kondrowawe hills. It flowed into Pécolom, and thence a part of its surplus water flowed through the Mada Horowe, or low-level sluice, where it has broken the bund, to Minnery; and the remainder escaped through the Goda Horowe, or high-level sluice, towards Kondrowawe, irrigating Meegahawelle, Talacolapitiya, and other tracts of lands, and eventually falling into the Ellehara canal. The Goda Horowe still exists, and the water collected by the ruined embankment in wet weather flows down in a large stream now called the Radawige Oya, which, as we before mentioned, breached the canal embankment near Talacolapitiya.

From Pécolom we proceeded to Kondrowawe, a distance of about 4 miles, and having brought with us guides in whom we could place greater reliance than in our former ones, we commenced on the 22nd to follow out the canal towards Minnery, which we had formerly been obliged to abandon. Having satisfied ourselves that the canal most probably did lead to Minnery, we started on the morning of the 23rd, having sent our horses by the path to the village of Ihekoolowadia, on the banks of that lake, and surveyed the canal into the village tank, which is separated from Minnery by its embankment only. The distance was 5 miles, and the canal was found to be much smaller and less perfect than any we had previously surveyed. The numerous breaches are to be attributed to the close proximity of the hills. The greater part of it is excavated, instead of being embanked. Not far from the point where the canal enters Ihekoolowawe we found a stone breakwater dividing the stream. We

followed the larger and lower branch, having gone along the other one for a short distance and found it very indistinct and at a much higher level. We consider that this branch was simply for the escape of surplus water, lest the swollen stream of the canal should destroy the embankment of the tank, which is not far from the point at which it enters it.

We have thus satisfactorily ascertained that the water was conveyed from the Ambanganga near Ellehara to Kondrowawe, and thence into Minnery Lake; that another canal led the water of that lake above the level of Kowdella to Gantalawe,—thus verifying the native tradition, which we found consistent and unvarying throughout the whole line, until we reached the Malabar country, a distance of not less than 57 miles. Mr. Turnour, in his *Notes on Canals and Watercourses*, in the *Ceylon Almanac* for 1833, remarks, that “under the most favourable circumstances, their length is double, and in some instances four and five times the direct distance. Judging from these peculiarities, and giving a conjectural opinion, in each instance, of the nature of the country, a canal from Ellehara to Kandelly would exceed 100 miles.” Our survey shows that Mr. Turnour over-estimated the length of the canal.

We have also ascertained that Kowdella was filled by another canal from Minnery. That a canal connected Kondrowawe with Giritella we have no moral doubt, although our time was too limited to enable us to explore it. We had it cleared for 6 miles, and rode along it nearly 2 miles, and the traditions at Kondrowawe and the neighbourhood of Giritella entirely coincide. It will be seen that there are still other canals connected with these, which we have not been able to explore; but we trust that the results of this expedition may afford a clue to the unravelling at some future time of the wonderful network of canals with which this part of the country was intersected.

“To have traced the line of the Ellahara canal through a mountainous country alone evinces the knowledge and great exertions of the natives of a former date.”*

Had Mr. Brooke been in possession of the information which we have since obtained, the foregoing remarks would have told with tenfold force, for not merely did the projectors of this canal display profound engineering skill in completing the work, but they formed and carried into effect the still more wonderful conception of uniting a portion of the waters of the Kiri Oya, a river flowing on the opposite side of a high range of hills, with those of the Ambanganga at Kondrowawe, thence distributing them by minor canals throughout the country, and eventually reuniting the waters of the Kiri Oya in the Minnery Lake.

From our observations during the survey we think it probable that the face of the country was at that time comparatively free from jungle, and that, therefore, the difficulty of taking accurate levels was not then nearly so great as it would be at present. It seems, however, probable, from the growth of the forest in the bed of the canal, that many centuries have elapsed since it fell into disrepair.

In contemplating the grand conception of the projectors of these works, the economy of labour in availing themselves of the natural features of the country, and thus securing such great results by the construction of a single embankment; the wisdom displayed in diverting a large river from its profitless course, and thus diffusing wealth and prosperity through a previously barren waste; and the forethought in turning to account the drainage of the vast expanse of country through which the canal passes, cannot fail to excite wonder and admiration.

It is melancholy to regard the present altered condition of a country once brought by so much skill and labour to a state of perfect fertility. The Amban-

* Brooke's Report, p. 61.

ganga now rolls on in its former unprofitable course. The streams, once checked and diverted into numberless tanks, flow through the breaches of the embankment, and are lost in the forest, and the whole country has become again a desolate and unhealthy jungle. Even at this, the most healthy season of the year, out of about 40 people who accompanied us only seven have escaped fever and dysentery.

The population of the few remaining villages is annually decreasing. Between Ellehara and Kondrowawe we passed near five villages recently deserted, and many places were pointed out to us as the sites of villages abandoned within the last century. Some idea may be formed of the depopulated state of the country by the fact, that, in a distance of 24 miles, there is not one inhabited village, although we passed some fields which are still occasionally cultivated by the people of either Ellehara or Kondrowawe.

The excellent state of repair in which we found the embankment* from Ellehara to Kondrowawe, suggests to us the feasibility of restoring these works to their former state; but we do not think that any benefit would arise from the repair of the canal from Kondrowawe to Minnery, as the waste water would naturally fall over the spill-water into the Talawatura, and so into that lake, and the canal which we traced can only have been formed in order to complete the line of navigation.

We are not in a position to speak with any degree of certainty as to the practicability or otherwise of repairing the line from Minnery to Gantalawe.

To revert to the first part of the work. The dam across the Ambanganga could easily be rebuilt; and the repair of the fourteen important breaches which occur in the entire line of embankment present no serious engineering difficulties. A natural bed of rock having in every instance been selected for the spill-waters, their restoration would be comparatively easy. To effect these repairs a large force of men would be necessary, as operations could only be carried on for about three and a half months in each year, owing to the floods during the rainy season. A great obstacle, too, would be found in the difficulty of obtaining a sufficient supply of water for the workmen.

It would be useless, however, to attempt these repairs unless Government were prepared to import population on an extensive scale, for the cultivation of the lands which would be made available by the vast supply of water which would then be at command. But this does not seem an insuperable obstacle when we take into consideration the over-populated state of parts of the south of India, which is such, that in one of the 20 provinces of the Madras Presidency alone, a few years back, no less than 200,000 people died from famine in one year; and we believe we are correct in stating that last year the Government was compelled to support 100,000 people to prevent them from meeting the same fate.

Before entertaining the idea of repairing these works a trigonometrical survey of that part of the island would be indispensable, in order to ascertain what the effect of the accumulation of so large a body of water would be upon the adjacent country; and for this great natural facilities exist in consequence of the numerous isolated hills with which the neighbourhood is studded. We have ascended several of these isolated points, and examined the country with a view of ascertaining the feasibility of a thoroughly organized system of triangulation.*

* If the repairs were effected, a large body of water would flow over the Kondrowawe spill-water into Minnery; this would find its outlet by the low-level escape channel or Mahawana, and flow into Kowdella. Thence we think the water would escape by the large breach into the Kowdelle Aar, which is said to join the Mahawellaganga near the point at which the Virgil Aar strikes off. There is no doubt that this stream enters the Mahawellaganga, and should it prove that

We originally planned this expedition for our own satisfaction, but finding that its results have so greatly exceeded our expectations, we have resolved to communicate them to Government, hoping that they may prove not devoid of interest.

ALEX. YOUNG ADAMS.

JOHN F. CHURCHILL, C.E.

J. BAILEY.

Sept. 19, 1855.

3. *Report on the Kandelly Tank*, by CAPTAIN SIM, R.E.

SIR,

Royal Engineer's Office, Kandy, 22nd April, 1856.

I HAVE the honour to acquaint you, that on the 20th June, 1855, I addressed a Report to his Excellency the Governor concerning the Kandelly Tank, and its probable capabilities for the purposes of irrigation. That Report was necessarily conjectural, as I was not in a position to obtain precise information, but having, in February last, had the honour of accompanying his Excellency to the spot, and since received his instructions to make a detailed investigation of the subject, I beg now to lay before you the opinion I have been enabled to form.

As, according to our regulations, it will be requisite for you to transmit a copy of this letter to Sir J. Burgoyne, the Inspector-General of Fortifications, I trust I shall be excused if I advert more fully to the general question of the tanks, than I should have done, had I to address the Colonial Government alone.

Throughout the northern and eastern provinces of Ceylon are to be found very many of these tanks, or artificial reservoirs of water, formed by the construction of a dam or bund across the gorge of a valley, and fed by the drainage of the surrounding districts. Some, such as Minnery and Kandelly, are beautiful sheets of water, at times from 15 to 20 square miles each in area; others contain but little water; while the majority, broken through at the bund, and thoroughly drained, appear as plains of grass in the midst of the forest.

The value of water so stored up, in a tropical country, is incalculable. That the ancient inhabitants of the island were aware of this, it is only necessary to contemplate the remains of the great works they executed for the purpose. Without a supply of water at the proper season the crop of paddy or rice fails, and famine ensues, followed by the utter abandonment of villages and districts. With the tanks in order, prosperity and no slight degree of civilization prevailed among the Singhalese; but with the means of irrigation and agriculture neglected, the country has become desolate and unhealthy, while the natives have gradually fallen into their present state of helplessness and degeneration.

In my letter of June I alluded to the flourishing state of Tanjore, and the vast sum of half a million paid by Ceylon annually for grain, principally to that country. With an expenditure on works of irrigation of 4000*l.* per annum for 50 years, that district has so prospered that the population has doubled, and the revenue risen from 300,000*l.* to 500,000*l.*, while the saleable value of the land is now equal to four millions. Had half the money spent on such works in Tanjore been spent in Ceylon instead, in keeping in repair those already existing here, this island would probably have exported, over and

its junction is below the point at which the Virgil Aar strikes off, the addition of this large body of water to the stream might result in opening the navigation of the Mahawellaganga; an object which, in 1832, occupied the attention of Government. (Vide Brooke's Journal, p. 29.)

above its own wants, as much grain as it now depends on other countries to supply.

However fully recognised may be the importance of the tanks, it is not within reason to expect, that the Government could at once plunge into any costly scheme for their restoration. Yet, to overlook them altogether—to cast aside all consideration of those that even now might be turned to profitable account—would be equally injudicious. An experiment on a small and inexpensive scale might surely first be tried before the subject is entirely rejected—if successful, it could be repeated; if a failure, but little would be risked.

Of all the tanks, Kandelly offers the most advantages for such an experiment. Presenting to view an area of about 15 square miles in the rainy season, and never less than three in the driest, it is enclosed by hills of moderate elevation, covered with forest—a slope of grass extending from the border of trees to the edge of the water.

The artificial bund by which it is retained is a mile and a quarter in length, about 50 feet in height, with a base of from 150 to 200 feet. Its inner side is faced the whole way with loose boulders, to protect the embankment from the action of the water. Two stone sluices or aqueducts, at different sites and levels, each with two watercourses, separated from one another by a stone partition, are constructed underneath the bund; and the streams they supply, uniting at a short distance, flow for 12 miles into Tamblegam Bay, which is close to the harbour of Trincomalie. The high road to that port from Kandy runs by Kandelly, rendering the tank easily accessible; by Tamblegam Bay it is 21 miles, by the high road 25, from Trincomalie. With the exception of the sluices the bund may be pronounced in a perfect state. The immense stones that formed the upper sluice have fallen in, nevertheless the water percolates through them, and affords an ample stream for the greater part of the year, but in the dry season it sinks below the level of the outlet.

The lower sluice is about 12 feet below the surface of the water when the upper one ceases to run. It has never been uncovered, and, on the whole, may be said to be in order, excepting that part of the water escapes out of the side close to the lower end of the watercourse. The stream is always full, however, and the sluice no doubt will perform its part for many years to come.

There are two other sources of contribution to the main Tamblegam stream or river; one proceeding from the small tank of Winderasen, 2 miles to the north of Kandelly, and about 3 square miles in extent, which affords, for more than half the year, no inconsiderable supply, and the other from the spill-water or waste weir of Kandelly, whenever the water rises excessively in the height of the rainy season.

But the reason, above all, why Kandelly offers greater advantages than any other tank is, that, whereas population is wanting in the vicinity of almost all, large paddy-fields, worked by a considerable number of natives, are to be found on the banks of the Tamblegam river. The only experiment therefore needed is the improvement and extension of what now exists as a nucleus.

There are two settlements at present earning their maintenance by the help of the water of the tank: Kandelly village is close to the bank, and Tamblegam village is situated on the bay of that name. The former is but 25 ammunams, or 50 acres in extent, with about 30 families, and is almost wholly private property. The latter is 2500 ammunams, or 5000 acres, all cleared and ready for planting, with a rich soil returning fifteen-fold; and the population is between 300 and 400 families. More than one-tenth of the area is scarcely ever under cultivation at the same time. Yet with these fine fields close at hand, Trincomalie has been known to be half starved at times, for want of rice. On one occasion, within the last two years, when there was a

great deficiency in the town, the authorities proceeded, out of necessity, to seize by force all the grain to be found in the neighbouring villages; giving, however, ample remuneration to the owners.

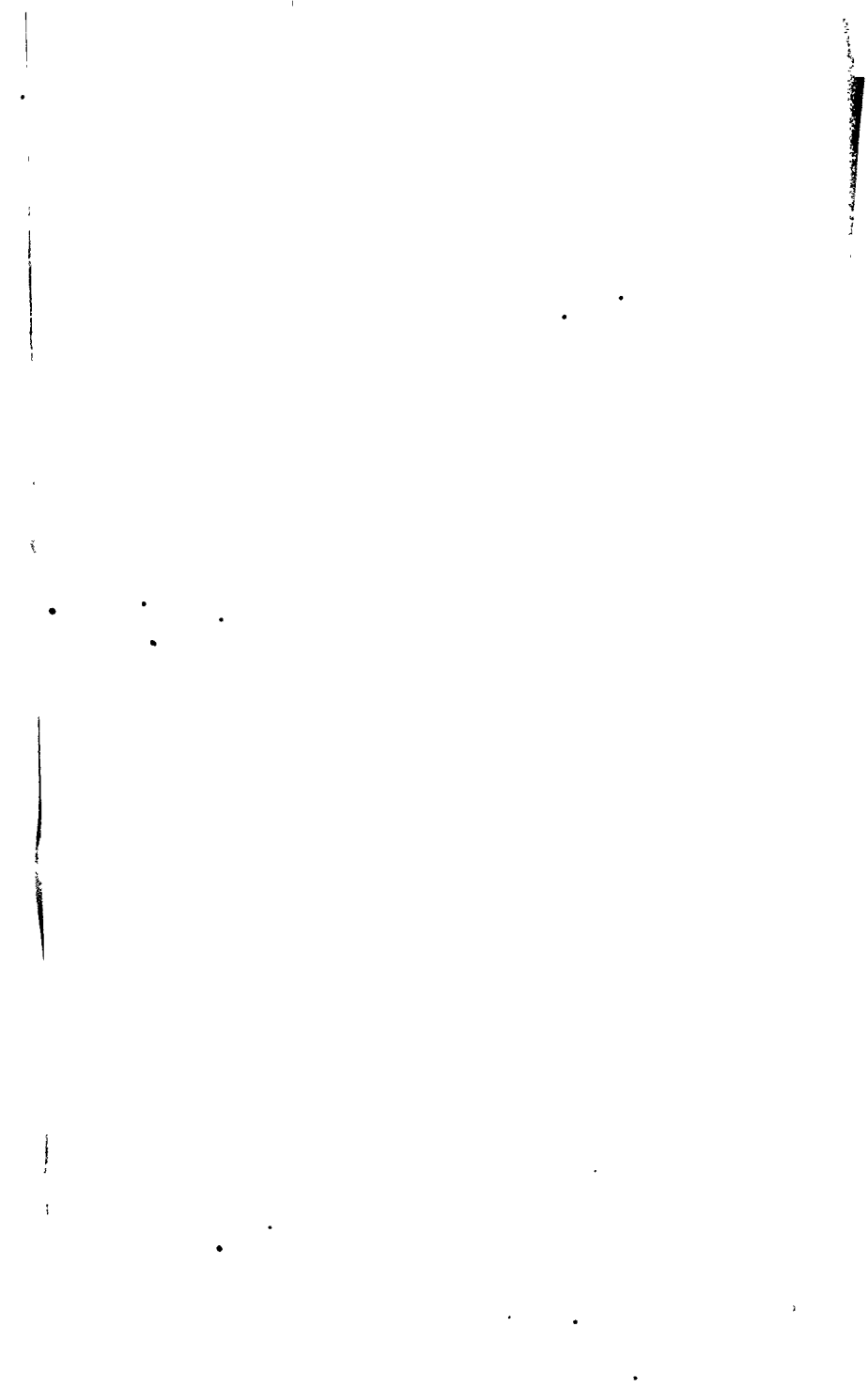
The point to which I would beg particular attention is, that out of these 2500 ammunams, 1000 are declared by the Wannia to be the property of the Crown. At one time or another they have all been cultivated, though now they are rarely touched. If offered for sale, I am assured the land would not fetch 15s. per acre, even if purchasers could be found to invest, the population being too scanty for an increase of cultivation. But I am persuaded, that if the Government would undertake to divide the area into allotments of two ammunams each, which is about the extent that one man and his family will be able to work, allow them to be held for the three succeeding years after the first (which should be rent free) on the small tax of a tithe of the produce, and at the expiration of that period sell them on regular titles, with the right of preemption to the then occupants, no difficulty will be experienced in obtaining the necessary amount of population. Should it, however, be found that the people of these parts, reduced as they are to the extreme of poverty, are not in a position to avail themselves of such an offer on the part of Government, being without the means of purchasing buffaloes, or implements of husbandry, or of providing themselves with food during the first year of occupation, I would respectfully suggest the proposition, that advances of 1350*l.*, confined to 100 men or families, might be made for these purposes, to be repaid to Government in four years, in the manner detailed in Appendix.

If this scheme were to answer, a second batch of 100 might be, in like manner, accommodated, till the whole 1000 ammunams, sustaining 500 families, were under cultivation.

No outlay beyond the advances would be required, for the bund and sluices of the tank need no repair. Sufficient water flows at present from them for the irrigation of 1250 ammunams, allowing, according to Col. Cotton's estimate, 7500 cubic yards for the irrigation of each acre, and taking the tank at its smallest extent, of about three square miles, with an average available depth of six feet.

The only requirement is, the clearing of the jungle over the sluices, and this should be done forthwith, whatever the future intentions of Government may be with regard to Kandelly. Nothing but the gradual expansion of the roots of the trees, aided by the force of running water, could have availed to displace the huge stones of the sluice. Those which capped the lower ends of the watercourses are, from their dimensions, nearly six tons each in weight; one is split, and the other thrown down.

Looking beyond the time when these Crown fields may be brought into cultivation, in the manner described, there is no reason why nearly the whole of the land bordering on the Tamblegam river should not ultimately be laid out, sold, and turned to similar account; to the extent of half a mile on each side, and for the whole distance from the tank to Tamblegam, constituting an area of between 3000 and 4000 ammunams. In the event, however, of Government considering it worth while, at any future period, to carry this idea into practice, it will be essential to husband the supply of water in the tank, and regulate its discharge. Since more than treble the quantity would then be required, none should be permitted, as now, to run to waste in the wet season. But, for this purpose, new sluices would be necessary. The old sluices are defective, and to repair them would be expensive and troublesome in the extreme. The very removal or shifting of the enormous stones would be, of itself, a work of the severest labour, and considerable time. I should, therefore be disposed to recommend the adoption of new sites for the sluices, allowing, till their completion, those now in operation to perform what service they could. The



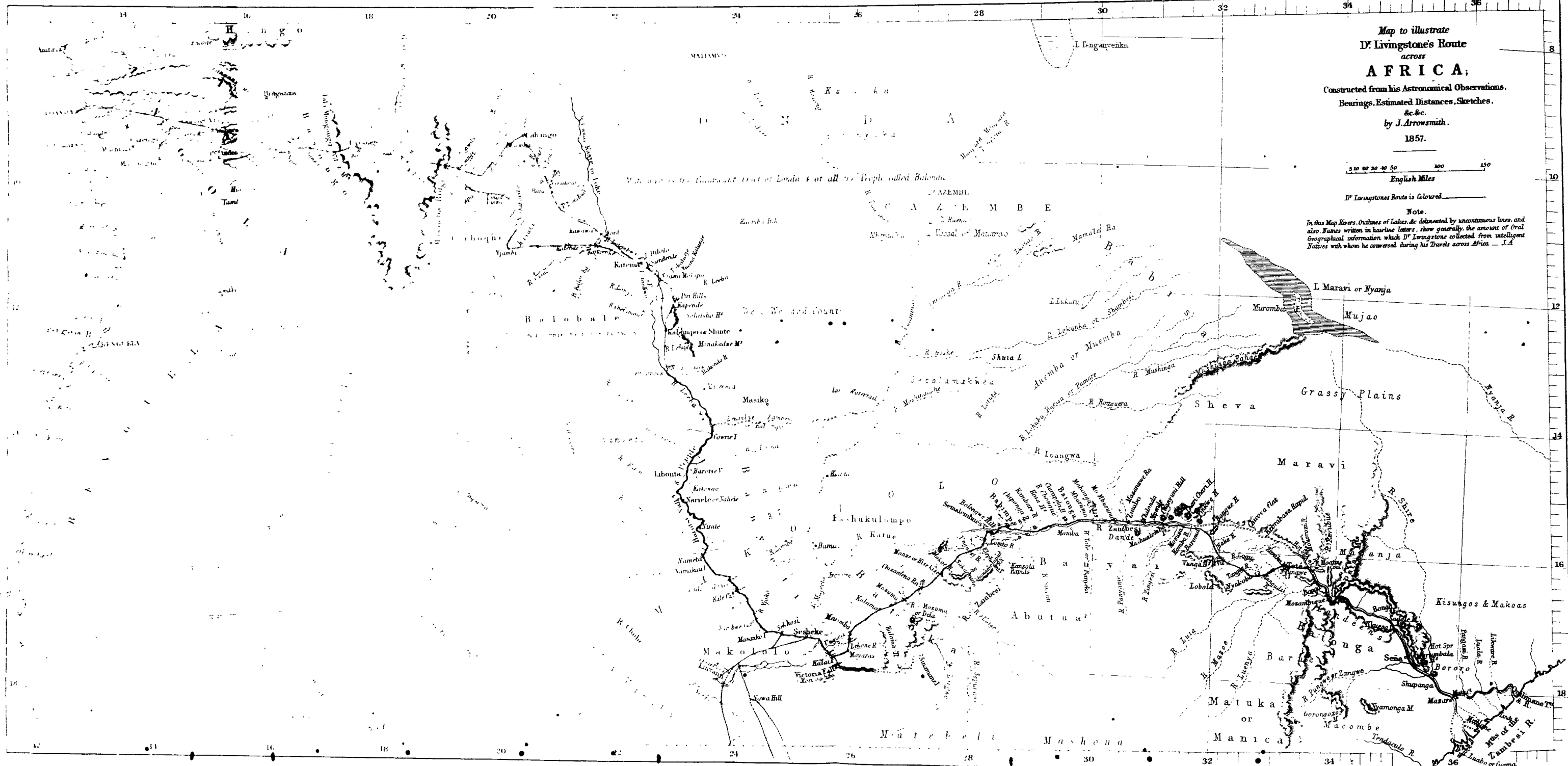
Map to illustrate
Dr Livingstone's Route
across
AFRICA;

Constructed from his Astronomical Observations,
Bearings, Estimated Distances, Sketches,
&c. &c.
by J. Arrowsmith.
1857.

50 100 150
English Miles

Dr Livingstone's Route is Coloured

Note.
In this Map Rivers, Outlines of Lakes, &c. delineated by uncontinuous lines, and
also Names written in *italics*, show generally the amount of Oral
Geographical Information which Dr Livingstone collected from intelligent
Natives with whom he conversed during his Travels across Africa. — J.A.



coffer-dams would involve less trouble in their construction, and instead of stone watercourses, it would be preferable to substitute large cast iron pipes, of about three feet diameter. Such might be laid without difficulty, and the trees would not injure them. They should be furnished with sluice doors at each end, and a competent person should be appointed to have them charge.

I cannot conclude this letter without stating, that I was accompanied at Kandelly and Tamblegam by Mr. Birch, without whose intelligent aid, and knowledge of the country and language, I should have been at a loss to pursue any inquiry into the subject of this Report.

XVII.—*Explorations into the Interior of Africa.* By Dr. DAVID LIVINGSTONE,* M.D., LL.D., F.R.G.S., etc. (*Gold Medallist.*)

(Continued from Vol. XXVI.)

(Addressed to Sir R. I. MURCHISON, Pres. R.G.S.)

Read, December 15, 1856.

1. *From Cabango to Linyanti; with a Dissertation on the Structure of the Southern Part of the African Continent. Forwarded from Tété on March 3, 1856.*

Linyanti, on the River Chobe,
Oct. 16, 1855.

SIR,—By a note dated Cabango, in August last, I endeavoured to convey an idea of the country between Cassangé and that point, and, if the rough tracing enclosed reached its destination, you will have remarked that there was little absolutely new to communicate. The path followed is that usually trodden by native Portuguese, who are employed by the Angolese merchants to trade with Matiamvo—the “Muata-ya-nvo” of some—the paramount chief of the negro tribes called Londa (Lunda) or Balonda. There is another and straighter course situated a little farther north, and I suppose it is there the scarcity of water mentioned by others is experienced. We never found it necessary to carry a supply, and almost always spent the night at villages situated on streams or rivulets. A Portuguese merchant and planter, Senhor Graça, of Monte Allegre, whose acquaintance I had the pleasure of making, was once a visitor of Matiamvo; and his notes, having been published in the Government Gazette or “Boletim” of Loanda, might, I conceive, still be found in Lisbon.† A severe and long-continued attack of fever, soon after crossing the Quango, made me so very feeble and deaf, that I was glad to avail myself of the company and friendly aid of three native Portuguese, whose employer, Senhor Neves of Cassangé, very politely enjoined them by

* Dr. Livingstone formerly wrote “Livingston,” without the e.—ED.

† See R. G. S. Journal, vol. xxvi., pp. 123, 128.—ED.

letter to forward my plans by every means in their power. The virtue of the Cheboqué (Cheebokwé) was thereby not exposed to temptation to take advantage of my weakness—a temptation which often proves rather too powerful for the goodness of more enlightened specimens of humanity. The most then I could effect in the circumstances was to put down the rivers with greater precision than any of my predecessors, who have uniformly been unfurnished with instruments.

The rate of travelling of such traders may be interesting to those who examine their accounts of journeys to otherwise unknown regions. I found the average between a great number of regular sleeping stations to be 7 geographical miles. The average time required was $3\frac{1}{2}$ hours, and the speed 2 geographical miles an hour. The stoppages from all causes amounted to 20 days monthly; so that a month's journey means actually one of 10 days, or 70 miles. The carriers are very unwilling to help each other; hence the sickness of one man often stops the march of the whole party. When we parted with them, our own rate was $10\frac{1}{2}$ geographical miles per day. This required an average of 5 hours' march at the rate of 2 geographical miles an hour, and we travelled 20 days each month. The negro step was quicker than ours, but we generally overtook them while resting, and arrived in equal times. If we kept going for 6 successive days, both men and oxen showed symptoms of knocking up, although they were a most willing company, and all were anxious to get home. It was therefore necessary to give another day weekly for rest, besides Sunday. The starchy nature of the food had, I believe, considerable influence on the rate of progress. In winding through forest, I could not make any approach to a reckoning of distance; an observation was always necessary. The zigzag would make the day's march to be probably not much under 20 miles in these cases.

I had indulged the hope of proceeding to the head-quarters of Matiamvo, who seems to be located 19 days east-north-east of Cabango, or on lat. $8^{\circ} 20' S.$, long. $22^{\circ} 32' E.$ But the long delay had now made such an inroad into our stock of goods that we saw clearly, by the time of our arrival there, we should be unable either to give a suitable present to the prince, or pay our way afterwards to the south. This alone would not have proved a barrier, for a branch of the Leeambye or Zambesi is reported to flow southwards from a part a few days east of his town, 23° or $24^{\circ} E.$ long. (?), and it would have been of great importance to have discovered water conveyance all the way down to the country of the Makololo. But it is universally asserted and believed that Matiamvo will on no account permit any white man, or even native trader, to pass him in that direction; it is his own principal resort

for ivory. The tribes living there kill many elephants, and bring the ivory to him as tribute. They are called Kanyika and Kanyoka, or Banyika and Banyoka. Having but slender acquaintance with the Londa dialect, we felt that neither pay nor persuasion could be effectively employed to secure permission to follow our object; so we decided on leaving Cabango to proceed south-east to our friend Katema, and thence down the Leeba.

The people among whom we now travelled being Balonda only, we got on very comfortably, except in one instance, in which a chief named Kawawa, who had heard of our treatment by the Cheboque in going north, presumed on his possessing the fords of the Kasai, so far as to demand tribute from the white man. Nothing could exceed the civilities which passed between us on the Sunday of our stay in his town. But when we offered to cross the river he mustered all his forces to compel payment of "a gun, an ox, a man, a barrel of powder, a *black coat*! or a book which would tell him if Matiamvo had any intention of sending to cut off his head." Unless we had submitted to everything, as the Mambari do, and given a bad precedent for all white men afterwards, we were obliged to part with "daggers drawn." The canoes were all concealed among the reeds, but my men were better sailors than his; and having taken the loan of one by night, in order to show how scrupulously honest we were, we left it and a few beads on their own side of the river, and thanked them next morning for their kindness amidst shouts of laughter.

The route we followed to Katema, being considerably to the east of that by which we went to Loanda, a curious phenomenon, which then escaped our notice, was now discovered, viz. that of the river Lotembwa flowing in two nearly opposite directions. By the tracing sent from Angola, you will see it as if rising in the small lake Dilolo. Such seemed the fact as far as the southern portion of the river is concerned. Our former route having led us to the Kasai, at some distance west of the northern portion, we were not aware of its existence. In returning, however, we were surprised at being obliged to cross the Lotembwa before we reached Lake Dilolo. It was more than a mile broad, three or four feet deep, and full of Arum Egyptiacum, lotus, papyrus, mat-rushes, and other aquatic plants. Not being then informed of the singular fact that it actually flows N.N.W. into the Kasai, I did not observe the current, simply concluding it was a prolongation of the Lotembwa beyond the lake, and that it rose in a long flat marsh, as most of the rivers in this quarter do. But we were positively informed afterwards that the flow was to the Kasai, and not into Dilolo. I have no reason to doubt the correctness of this information. I could not ascertain whether Lake Dilolo gives much water to the northern Lotembwa; but had there been a

current of one-fourth the strength of that which flows into the southern Lotembwa, I must have observed it. It looks like an arm of the lake where I crossed it, and probably flows faster when nearer the Kasai. The southern Lotembwa proceeds from an arm of the lake, half a mile broad, and at the part where most of the water flows it is chin deep. We crossed the river above its confluence with the latter arm, and the great body of flowing, deep water it contained there (from 80 to 100 yards wide) made me suppose that it receives a supply from the northern as well as from the southern end of Dilolo. The fever having there caused vomiting of large quantities of blood, I could not return and examine the curious phenomenon more minutely; but I consider it as almost quite certain that Lake Dilolo divides its waters between the Atlantic and Indian oceans. A portion flows down the Kasai—Zaire, or Congo, and another down the Leeba to the Zambesi. The whole of the adjacent country is exceedingly flat. In coming to the Lotembwa from the north we crossed a plain 24 miles broad, and so level that the rain-water stands on it for months together; and when going north we waded through another plain to the south of the northern Lotembwa, 15 miles broad, with about a foot of water on it, and the lotus flowers in bloom therein.

As the Royal Geographical Society receives geographical information from every quarter, and then acts on the eclectic principle of securing the good and true from the heaps of materials which travellers abroad and loungers at home may send to the crucible, I have, with less diffidence than I should otherwise have felt, resolved to state some ideas which observation and native information have led me to adopt as to the form of the southern part of the continent. It is right to state also distinctly that I am now aware that the same views were clearly expressed in the anniversary speech of 1852, by the gentleman to whom this letter is addressed. Yet having come to nearly the same conclusions about three years afterwards, and by a different route, the reasons which guided my tortoise pace may, though stated in my own way, be accepted as a small contribution to the inferences deduced by you (Sir Roderick Murchison) from the study of the map of Mr. Bain.

In passing northwards to Angola, the presence of large Cape heaths, rhododendrons, Alpine roses, and more especially the sudden descent into the valley of the Quango, near Cassangé, led me to believe we had been travelling on an elevated plateau. I had hopes then of finding an aneroid at Loanda; but having been disappointed in this, from my friend Colonel Steele having gone to the Crimea, I had to resort, on my return, to observations of the temperature of boiling water as a means of measuring elevations. I have no table at hand for reducing degrees into feet,

and will give, therefore, a list of observations only. If you do not reject the instrument altogether, it will be allowed that there is some plausibility, at least, in what follows:—

		Brisk ebullition.	
		°	Feet.
Top of the rocks of Pungo Andongo	204	=	4210
Top of the ascent of Tala Mungongo	206		3151
Bottom of same ascent	208		2097
Bottom of eastern ascent	205		3680
Top of eastern ascent	202		5278
Dilolo	203		4741
Confluence of Leeambye and Leeba	203		4741
Linyanti	203½		3521
Lake Ngami	206° or 207	=	206½ 2600 to 3151

The highest point in the district of Pungo Andongo is given to show that it is lower than the ridge, which I believe is cut through by the valley of Cassangé, in which the Quango now flows. And the top of the ascent of Tala Mungongo—which, to the eye, looks much higher than the eastern ascent, if we may depend on the point of ebullition as an approximation—is in reality much lower; indeed not more elevated than Lake Ngami, which is clearly in a hollow. In coming along this elevated land towards the Quango, we were unconsciously near the crest of a large oblong mound, or ridge, which probably extends through 20° of latitude, and gives rise to a remarkable number of rivers: thus, the Quango on the north; the Coanza on the west; the Langebongo, which the latest information identifies with the Loeti, and the numerous streams which unite and form the Chobé, on its south-east; all the feeders of the Kasai and that river itself on the east; and probably also the Embara or river of Libébé on the south. Yet this elevation is by no means mountainous. The general direction of all these rivers, except the Coanza and Quango, being towards the centre of the continent, with a little northing or southing in addition, according as they belong to the western or eastern main drains of the country, clearly implies the hollow or basin form of that portion of intertropical Africa. The country about Lake Dilolo seems to form a partition in the basin; hence the contrary directions of its drainage.

Viewing the basin from this (Linyanti) northward, we behold an immense flat, intersected by rivers in almost every direction, and these are not the South-African mud, sand, or stone rivers either, but deep never-failing streams, fit to form invaluable bulwarks against enemies who can neither swim nor manage canoes. They have also numerous departing and re-entering branches, with lagoons and marshes adjacent, so that it is scarcely possible to travel along their banks without the assistance of canoes. We brought two asses as a present from certain merchants in Loanda to Sekelétu,

and as this animal is not injured by the bite of the tsetse, they came as frisky as kids through all the flowing rivers of Londa; but when we began to descend the Leeambye, dragging them almost hourly through patches of water or lagoons, they were nearly killed, and we were obliged to leave them at Naliele. These valley rivers have generally two beds, one of low water and another of inundation: The period of inundation does not correspond with the rainy season here, but with a period in the north subsequent to that. The flood of the Leeambye occurs in February and March, while that of the Chobe, from its being more tortuous, is a month later. We hear of its being flooded 40 miles above Linyanti, eight or ten days before it overflows there. When these rivers do overflow, then the valley assumes the appearance of being ornamented with chains of lakes. This is probably the geologically recent form which the great basin showed, for all the low-water channels in the flats are cut out of soft calcareous tufa, which the waters of this country formerly deposited most copiously. The country adjacent to the beds of inundation is, except where rocks appear, not elevated more than from 50 to 100 feet above the general level.

That the same formation exists on the eastern side of the country appears from the statements of Arabs or Moors from Zanzibar. They assert that a large branch of the Leeambye flows from the country of the Banyassa (Wun'yassa) to the south-west, and passes near to the town of Cazembé; it is called Loapola. The Banyassa live on a ridge parallel to the east coast; and though they have no lake in their own country, they frequently trade to one on their N.N.W. My Arab informants pass this lake on their way back to Zanzibar. It is said to be ten days' north-east of Cazembé, and is called Tanganyeinka (Tanganyeinka), and connected with another named Kalágue (Garague?). Both are stated to be so shallow that the canoes are punted the whole way across, and the voyage occupies three days. Will it be too speculative to suppose that these large collections of fresh water are the residue of greater and deeper lakes, just as Lake Ngami is? the openings in the eastern ridge not being deep enough to drain those parts of the basin entirely.

In a foray made by the Makololo to the country about east of Masiko's territory, during our visit to Loanda, they were accompanied by the Arab Ben Habib, from whom I received much of the above information. This party saw another river than the Loapola, coming from the north-east, with a south-west course, to form a lake named Shuia (Shooea). A river emerges thence, which, dividing, forms the Bashukulompo and Loangwa rivers. There is a connection between these and the Leeambye too, a statement by no means improbable, seeing the country around Shuia (lat.

13°, long. 27° or 28° E.?) is described as abounding in marshes and reedy valleys. When there, the Arab pointed to the eastern ridge, whence the rivers come, and said, "When we see that, we always know we are about to begin the descent of ten or fifteen days to the sea."

I am far from craving implicit faith in those statements, for my informants possess a sad proneness to "amiability," and they will roundly assert whatever they think will please you. For example:—"Are you happy as a slave?" "O, infinitely more so than when I was free;" and then run away from their masters. But my object in making inquiries was unknown; and, when supported by the testimony of the Makololo, the statements may be taken as supporting the view that the central parts of Africa south of the equator, though considerably elevated above the level of the sea, form really a hollow in reference to two oblong ridges on its eastern and western sides. As suggestive of further inquiry only, I may mention, though not pretending to have examined the pretty extensive portions of the country which came under my observation with the eye and deep insight of a geologist, that the general direction of the ranges of hills appears to be parallel to the major axis of the continent. The dip of the strata down towards the centre of the country led to the conclusion, before I knew of the existence of the ridges, that Africa had in its formation been pressed up much more energetically at the sides than at the centre. The force which effected this, I supposed, may have been of the same nature as that which determined most recent volcanoes to be in the vicinity of the sea. This seems to have been the case in Angola at least; and having probably been in operation over a vast extent of coast, decided the very simple littoral outline of Africa. I am induced to make this suggestion because, when the ridges are situated far from the coast, they do not seem to owe their origin to recently erupted rocks. There is a section of the western ridge, near Cassangé, nearly a thousand feet in height; and except a capping of hæmatite mixed with quartz pebbles, it is a mass of the red clay shale termed in Scotland "keel," the thin strata of which are scarcely at all disturbed. (This keel is believed to indicate gold. Had I met with a nugget I would have mounted a mule instead of the ungainly beast I rode.)

I have mentioned the locality of Lake Dilolo as forming a sort of partition in the central valley, but it is not formed by outcropping rocks, as one may travel a month beyond Shinte's without seeing a stone; but in proceeding south of Ngami, the farther we go the greater has been the filling up by eruptive traps. The 25th parallel of latitude divides a part of the valley, containing 1000 feet more filling up than that north of Kolobeng; and, strangely enough, the only instance of a large transported boulder occurs just at the edge of the more hollow part. The plains to

the south of that are elevated perhaps 5000 feet above the level of the sea. But the erupted rocks, as that on which Kuruman stands, have brought up fragments of the very old bottom rocks in their substance.

As I am not aware that the late Dr. Buckland made any public use of a paper which I sent to him in 1843, on the gradual desiccation of the Bechuana country, it may not be improper to mention, in support of the actual drying up of all the rivers which have a westerly course, that I pointed out the bed of a still more ancient river than those trickling rills which now pass by the name. It flowed from north to south, exactly as the Zambesi does now, and ended in a large lake, which must have been discharged when the fissure was made through which the Orange river now flows. At the point of confluence between river and lake some hills of amygdaloid caused an eddy, and in the eddy we have a mound of tufa and travertin full of fossil bones. From these I had hopes of ascertaining the age of the river; but, in addition to my time being much restricted by sacred duties, I had no instrument with me when I discovered these beautiful fossils, which stand out in relief on the rock. On the second occasion I was called off by express to the child of another missionary, and galloped a hundred miles to find him in his grave. To crown all, some epiphyses and teeth, which I sent with specimens to illustrate the geology of the interior, though taken to England by the Rev. H. H. Methuen, were stolen from the railway before reaching Dr. Buckland's hands. As it is not likely that I shall ever visit the spot again, I may mention that the mound is near Bootschap, and well known to the Rev. H. Helmore, who would willingly show it to any one desirous of procuring specimens. They are perfectly fossilised, and about the same size as zebras or buffaloes.

With respect to the spirit in which our efforts have been viewed by the Makololo, I think there is no cause for discouragement. The men of my company worked vigorously while at Loanda, and their savings appeared to them to be considerable. But the long journey back forced us to expend all our goods, and on arriving at the Barotsé we were all equally poor. Our reception and subsequent treatment were, however, most generous and kind. The public reports delivered by my companions were sufficiently flattering to me, and their private opinions must have been in unison, for many volunteers have come forward unasked to go to the east. A fresh party was despatched with ivory for Loanda, and only two days were allowed for preparation. They are under the guidance of the Arab from Zanzibar already alluded to, and the men have no voice in the disposal of the goods; they are simply to look and learn. After my late companions have rested some time, it is intended for them to return as independent traders. This was not my suggestion—indeed I could

scarcely have expected it, for the hunger and fatigue they endured were most trying to men who have abundance of food and leisure at home. But the spirit of trade is strong in the Africans, and they are much elated with the large prices given at Loanda.

If no untoward event interferes, a vigorous trade will certainly be established. The knowledge of the great value of ivory puts a stop to the slave-trade in a very natural way. As our cruisers on the west coast render property in slaves of very small value there, the Mambari, who are generally subjects of Kangombe of Bihé, purchase slaves for domestic purposes only; but to make such a long journey as that from Bihé to the Batōka country, east of the Makololo, at all profitable, they must secure a tusk or two. These can only be got among certain small tribes who depend chiefly on agriculture for subsistence, and are so destitute of iron that they often use hoes of wood. They may be induced to part with ivory and children for iron implements, but for nothing else. The Mambari tried cloth and beads unsuccessfully, but hoes were irresistible. The Makololo wished to put a stop to their visits by force, but a hint to purchase all the ivory with hoes was so promptly responded to, that I anticipate small trade for the Mambari in future. If any one among the tribes subject to the Makololo sells a child now, it is done secretly. The trade may thus be said to be pretty well repressed. A great deal more than this, however, is needed. Commerce is a most important aid to civilisation, for it soon breaks up the sullen isolation of heathenism, and makes men feel their mutual dependence. Hopes of this make one feel gratified at the success which has attended my little beginning. But it is our blessed Christianity alone which can touch the centre of the wants of Africa. The Arabs, it is well known, are great in commerce, but not much elevated thereby above the African in principle. My Arab friend Ben Habib, now gone to Loanda, was received most hospitably by an old female chief called Sebola Mokwaia; and she actually gave him ivory enough to set him up as a trader; yet he went with the Makololo against her to revenge some old feud with which he had no connexion.

DAVID LIVINGSTONE.

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2. *From Linyanti to the Falls of Victoria (Mosioatunya), thence across the hills to the Confluence of the Zambesi and Kafué Rivers, and along the Zambesi to Teté. With Remarks on the Structure of the South-eastern Part of the African Continent.*

Hill Chanyuné, on the banks of the Zambesi,
25th January, 1856.

SIR,—As we are now within a few days of the Portuguese station called Teté, I shall begin preparations for entering the world •

again by giving you a sketch of our progress thus far while my men are engaged in paddling each other across this broad river. No. 1 was written while waiting for rains at Linyanti, and refers chiefly to the country north of that point; and this No. 2 is intended as a sort of continuation, but directed principally to the eastern side of the continent.

When passing Seshéke in our way down the river in November last, the chief Sekelétu generously presented ten slaughter-cattle and three of the best riding oxen he could purchase among his people, together with supplies of meal and everything else he could think of for my comfort during the journey. Hoes and beads were also supplied to purchase a canoe, when we should come to the Zambesi again, beyond the part where it is constricted by the rocks. These acts of kindness were probably in part prompted by the principal men of the tribe, and are valuable as showing the light in which our efforts are viewed; but as little acts often show character more clearly than great ones, I may mention that—having been obliged to separate from the people who had our luggage, and to traverse about 20 miles infested by the tsetse during the night—it became so pitchy dark, we could only see by the frequent gleams of lightning, which at times revealed the attendants wandering hither and thither in the forest. The horses trembled and groaned, and after being thoroughly drenched by heavy rain we were obliged to give up the attempt to go farther, and crawled under a tree for shelter. After the excessive heat of the day one is peculiarly sensitive to cold at night. The chief's blanket had fortunately not gone on; he covered me with it, and rested himself on the cold, wet ground until the morning. If such men must perish before the white race by an immutable law of Heaven, we must seem to be under the same sort of "terrible necessity" in our "Caffre wars" as the American professor of chemistry said he was when he dismembered the man whom he murdered.

Our convoy down to Mosioatunya consisted of the chief and about 200 followers. About 10 miles below the confluence of the Chobé and Leeambye or Zambesi, we came to the commencement of the rapids. Leaving the canoes there, we marched on foot about 20 miles further, along the left or northern bank, to Kalai, otherwise called the island of Sekoté. It was decided by those who knew the country well in front, that we should here leave the river, and avoid the hills through which it flows, both on account of tsetse and the extreme ruggedness of the path. By taking a north-east course the river would be met where it has become placid again. Before leaving this part of the river I took a canoe at Kalai, and sailed down to look at the falls of Mosioatunya, which proved to be the finest sight I have seen in Africa. The

distance to the "Smoke-sounding" Falls of the Zambesi was about 8 miles in a S.S.E. direction, but when we came within 5 miles of the spot we saw five large columns of "smoke" ascending 200 or 300 feet, and exhibiting exactly the appearance which occurs on extensive grass-burnings in Africa. The river above the falls is very broad, but I am such a miserable judge of distances on water that I fear to estimate its breadth. I once showed a naval officer a space in the bay of Loanda which seemed of equal breadth with parts of the river which I have always called 400 yards. He replied, "That is 900 yards." Here I think I am safe in saying it is at least 1000 yards wide. You cannot imagine the glorious loveliness of the scene from anything in England. The "Falls," if we may so term a river leaping into a sort of strait-jacket, are bounded on three sides by forest-covered ridges about 400 feet in height. Numerous islands are dotted over the river above the falls, and both banks and islands are adorned with sylvan vegetation of great variety of colour and form. At the period of our visit many of the trees were spangled over with blossoms, and towering above them all stands the great burly baobab, each of whose (syenite-coloured) arms would form the bole of a large ordinary tree. Groups of graceful palms, with their feathery-formed foliage, contribute to the beauty of the islands. As a hieroglyphic, they always mean "far from home;" for one can never get over their foreign aspect in picture or landscape. Trees of the oak shape and other familiar forms stand side by side with the silvery Mohonono, which in the tropics looks like the cedar of Lebanon. The dark cypress-shaped Motsouri, laden with its pleasant scarlet fruit, and many others, also attain individuality among the great rounded masses of tropical forest. We look and look again, and hope that scenes lovely enough to arrest the gaze of angels may never vanish from the memory. A light canoe, and men well acquainted with the still water caused by the islands, brought us to an islet situated in the middle of the river and forming the edge of the lip over which the water rolls. Creeping to the verge, we peer down into a large rent which has been made from bank to bank of the broad Zambesi, and there we see the stream of a thousand yards in breadth suddenly compressed into a channel of fifteen or twenty. Imagine the Thames filled with low tree-covered hills from the Tunnel to Gravesend, its bed of hard basaltic rock instead of London mud, and a rent or fissure made in the bed, from one end of the tunnel to the other, down through the keystones of the arch, to a depth of 100 feet, the lips of the fissure being from 60 to 80 feet apart. Suppose farther, the narrow rent prolonged from the Tunnel to Gravesend along the left bank, and the Thames leaping bodily into this gulf, compressed into 15 or 20 yards at the bottom,

forced to change its direction from the right to the left bank, then turning a corner and boiling and roaring through the hills, and you may conceive something similar to this part of the Zambesi.

The river is reported to rush through the rent about 30 miles in an E.S.E. direction, and when free from its place of confinement it flows placidly again towards the north-east, till it reaches the latitude of $15^{\circ} 37'$ S. The falls, of which I am now writing, are in $17^{\circ} 57'$ S. lat. The side of the fissure opposite to that over which the river falls is quite perpendicular and has a straight edge, except at the left-hand corner, where a rent is visible and a piece seems inclined to fall off. It is composed of one unstratified basaltic rock. The side over which the river precipitates itself is perpendicular too; but in three of the five or six parts into which the stream is divided at low-water, about 3 feet of the edge of the lip is bevelled off. Several pieces also having fallen in give this lip a serrated edge; but the water falls at once clear of the rock and becomes a fleecy mass as white as snow. The pieces of water, if I may so express myself, do not at once lose their cohesion, but give off streams of vapour, in their downward course, exactly as comets are represented on paper, or as a piece of steel when burned in oxygen gas. The beautiful mass thus resembles a thousand comets speeding on their course. On looking down into the fissure on the right of the island, where the largest quantity of water falls, nothing is seen but a dense white cloud with two bright rainbows on it. (It was about mid-day and the declination of the sun nearly the same as the latitude when we visited it.) An immense stream of vapour rushes up from the cloud unlike anything I ever saw before. When about 300 feet high it loses its steam colour, becomes dark, and descends in a shower, exposure to which for a quarter of an hour wetted us to the skin. A few yards back from the opposite lip a dense unbroken hedge of ever-green trees stands. Their leaves are constantly wet from the condensed vapour, and from their roots several little rills run back into the gulf, but never reach the bottom, for the ascending columns of vapour literally lick them up off the perpendicular wall before they are half-way down. I have estimated the depth at 100 feet, but we cannot see what it is on the right of the island. On the left of the island a large piece has fallen in, and that lying on one side of the chafing river below enables me to form an approximation: my companions amused themselves by throwing stones down the falls, and wondering to see how small they became before they were lost in the cloud. In former days the three principal falls were used as places where certain chiefs worshipped the Barimo (gods or departed spirits). As even at low water there are from 400 to 600 yards of water pouring over, the constancy and loudness of the sound may have produced feelings of

awe, as if the never-ceasing flood came forth from the footstool of the Eternal. It was mysterious to them, for one of their canoe songs says,

“ The Liambai,—nobody knows
Whence it comes or whither it goes.”

Perhaps the bow in the cloud reminded them of Him who alone is unchangeable and above all changing things. But, not aware of his true character, they had no admiration of the beautiful and good in their bosoms. Secure in their own island fortresses, they often inveigled wandering or fugitive tribes on to others which are uninhabited, and left them there to perish. The river is so broad, that, when being ferried across, you often cannot see whether you are going to the main land or not. To remove temptation out of the way of our friends, we drew the borrowed canoes last night into our midst on the island where we slept, and some of the men made their beds in them. I counted between fifty and sixty human skulls mounted on poles in a village near Kalai, being those of men slain when famishing with hunger; and I felt thankful that Sebituane had rooted out the bloody imperious “ Lords of the Isles.”

That trade has never extended thus far from either the east or western coasts, is, I believe, extremely probable from the grave of the elder Sekoté being still seen on Kalai Island, ornamented with seventy large elephant's tusks planted round it, and there are about thirty tusks over the resting-places of his relatives. Indeed, ivory was used only to form the armlets and grave-stones of the rich, and it is now met with in a rotten state all over the Batōka country. This fact I take as corroborative of the universal assertion, that no trader ever visited the country previous to the first and unsuccessful attempt of the Mambari to establish the slave-trade with Santuru, the last chief of the Barotsé.

Before concluding this account of the falls, it may be added that the rent is reported to be much deeper farther down, perhaps 200 or 300 feet; and at one part the slope downwards allows of persons descending in a sitting posture. Some Makololo, once chasing fugitives, saw them unable to restrain their flight, and dashed to pieces at the bottom. They say the river appeared as a white cord at the bottom of an abyss, which made them giddy and fain to leave. Yet I could not detect any evidence of wear at the spot which was examined, though it was low water, and from seven to ten feet of yellow discolouration on the rock showed the probable amount of rise. I have been led to the supposition by the phenomena noticed by both Captain Tuckey and Commander Bedingfield in the Congo or Zaire, that it, as well as the Orange River, seems to be discharged by a fissure through the western

ridge. The breadth of the channel among the hills, where Captain Tuckey turned, will scarcely account for the enormous body of water which appears farther down. Indeed, no sounding can be taken with ordinary lines near the mouth, though the water runs strongly and is perfectly fresh.

On the day following my first visit I returned to take another glance and make a little nursery-garden on the island; for I observed that it was covered with trees, many of which I have seen nowhere else; and as the wind often wafted a little condensed vapour over the whole, it struck me this was the very thing I could never get my Makololo friends to do. My trees have always perished by being forgotten during droughts; so I planted here a lot of peach and apricot stones and coffee-seed. As the island is unapproachable when the river rises, except by hippopotami, if my hedge is made according to contract, I have great hopes of Mosioatunya's ability as a nurseryman. On another island close by, your address of 1852 remained a whole year. If you had been a lawyer, instead of a geologist, your claims to the discovery would have been strong, as "a bit of your mind" was within sight and sound of the falls very long before the arrival of any European. I thank you for sending it.

The former name of the spot was Shongwé, the meaning of which I cannot ascertain. The Makololo, in passing near it, said, "Mosi oa tunya," "smoke does sound." Very few of them ever went near to examine the cause before my visit. When the river is in flood, the vapour is seen and the sound heard ten or more miles distant. Although I have not felt at liberty to act on my conviction on the subject of names, I think all rivers and hills discovered by Englishmen ought to have English names. The African name is known only to people in the locality. I could not get the name Zumbo lately from the people among the ruins, and passed Dambarari on the opposite side of the river, nobody having ever heard the name before. The same would have happened of course had they been English or Portuguese names, but we should not have the nonsense with which, by misspelling, we and the printers disfigure the maps. See how many ways Bechuanas are mentioned—Booshuanas, Bootjouanas, Bertjouanas, &c.: Makrakka for Makabé; Marelata for Moretlé; Wanketzeens for Bangwaketse; Beza (God) for Reza. We on the spot are often misled by getting information from (native) foreigners, who pronounce names according to their own dialects, and are thereby often guilty of leading those at home astray. English names too are surely better than the round of Dutch names,—“sand,” “stone,” “mud,” or “reed” rivers. I do not urge the point, but I think it merits consideration.

Shaping our course now to the north-east, we left the hills which

confine the river on our right. When we got free of tsetse and night-travelling, we found a fine open country with gently undulating lawns, ornamented with large spreading trees, which had once given shade in towns and villages, the ruins of which are everywhere visible. There are also many patches of forest, but, as it often happens in this country, the wood grows chiefly on the hills. The large game has now undisturbed occupation of what were the pleasant haunts of men, and immense herds of buffaloes quietly grazing or reclining added to the beauty of the scene.

The sources of the rivulets, which have all a mountain-torrent character, as well as the temperature of the boiling water, showed that we were now ascending the eastern ridge. The first stream is named Lekoné, and is perennial. It runs in what may have been the ancient bed of the Zambesi, before the fissure was made. I could examine it only by the light of the moon, but then it seemed very like an ancient river channel. The Lekoné runs contrary to the direction in which the Zambesi did and does now flow, and joins the latter five or six miles above Kalai. If little or no alteration of level occurred when the fissure was formed, then, the altitude of the former channel being only a little higher than Linyanti, we have a confirmation of what is otherwise clearly evident, that the Zambesi was collected into a vast lake, which included not only Lake Ngami in its bosom, but spread westwards beyond Libelé, southwards and eastwards beyond Nchokotsa. Indeed, in many parts south of Ngami, when an anteater makes a burrow, he digs up shells identical with those of mollusca now living in the Zambesi. And all the surface indicated is covered by a deposit of soft calcareous tufa, with which the fresh waters of the valley seem to have formerly been loaded. The Barotsé valley was probably discharged by the same means; for Gonyé possesses a fissure character, and so does another large cataract situated beyond Masiko in the Kabompo.

It would be interesting to ascertain if these rents were suddenly made and remain in their original state, or whether they are at present progressive. I had a strong desire to measure a point of that of Mosioatunya, but had neither the means of accurate measurement, nor of marking the hard rock afterwards. They have proved drains on a gigantic scale; and if geologists did not require such eternities of time for their operations, we might hazard a hint about a salubrious millenium for Africa.

Shall we say that they are geologically recent, because there is not more than 3 feet worn off the edge subjected to the wear of the water? and that they are progressive, as the gradual desiccation of the Bechuana country shows a slow elevation of the ridges? No one will probably think much of the negative fact, that there is no trace of a tradition in the country of an

earthquake. The word is not in the language; and though events centuries old are sometimes commemorated by means of names, I never met with any approach to a Tom Earthquake or Sam Shake-the-ground among them. Yet they do possess a tradition which is wonderfully like the building of the Tower of Babel, ending differently, however, from that in the Bible, the bold builders having got their heads cracked by the giving way of the scaffolding. There is also the story of Solomon and the harlots; and all trace back their origin to a time when their forefathers came out of a cave in the north-east in company with animals. The cave is termed Loé (Noé?), and is exceptional in the language, from having masculine pronouns.

Still ascending the western side of the ridge, we cross another rivulet named Unguesi, which flows in the same direction as Lekoné, and joins the Zambesi above the point where the rapids begin. The next tributary, called Kalomo, never dries; and being on the top of the ridge, runs south, or south and by east, falling into the Zambesi below the falls. Lastly, we crossed the Mozuma, or Dela, flowing eastwards. We continued the eastern descent till we came to the Bashukulompo River, where it may be said to terminate, for we had again reached the altitude of Linyanti. We intended to have struck the Zambesi exactly at the confluence, but we were drawn aside by a wish to visit Semalembué, who is an influential chief in that quarter. The Bashukulompo River is here called Kahowhé, and farther down it is named Kafué. Passing through some ranges of hills, among which the Kafué winds, we came to the Zambesi, a little beyond the confluence. It is here much broader than that part of it called Leeambye, but possesses the same character of reedy islands, sandbanks, and wonderful abundance of animal life. It was much discoloured by recent rains; but as we came down along the left bank, it fell more than 2 feet before we had gone 30 miles. It is never discoloured above Mosioatunya. Hence I conclude the increase or flood was comparatively local, and effected by numerous small feeders on both banks east of the ridge. When we ascended the Zambesi, towards Kabompo, in January, 1854, the annual flood which causes inundation had begun, and with the exception of sand, which was immediately deposited at the bottom of the vessel, there was no discolouration. Ranges of hills stand on both banks as far as we have yet seen it. The usual mode of travelling is by canoe, so there are generally no paths, and nothing can exceed the tedium of winding along through tangled jungle without something of the sort. We cannot make more than 2 miles an hour; our oxen are all dead of tsetse, except two, and the only riding ox is so weak from the same cause as to be useless. Yet we are more healthy than in the journey

to Loanda. The banks feel hot and steamy both night and day, but I have had no attack of fever through the whole journey. I attribute this partly to not having been "too old to learn," and partly to having had wheaten bread all the way from the waggon at Linyanti. In going north we braved the rains, unless they were continuous; and the lower half of the body was wetted two or three times every day by crossing streams. But now, when rain approaches, we halt, light large fires, and each gets up a little grass shed over him. Tropical rains run through everything, but, though wetted, comparatively little caloric is lost now to what would be the case if a stream of water ran for an hour along the body. After being warmed by the fire, all go on comfortably again, and the party has been remarkably healthy. In the other journey, too, wishing to avoid overloading the men, and thereby make them lose heart, I depended chiefly on native food, which is almost pure starch, and the complete change of diet must have made me more susceptible of fever. But now, by an extemporaneous oven formed by inverting a pot over hot coals, and making a fire above it, with fresh bread and coffee in Arab fashion, I get on most comfortably. There is no tiring of it. I mention this because it may prove a useful hint to travellers who may think they will gain by braving hunger or wet.

From the longitudes, I estimate the distance from top to top of the ridges to be about 600 geographical miles. I purposely refrain from mentioning any of my own calculations of lunar observations, because it would appear so presumptuous to allow them to appear on the same page with those of Mr. Maclear, who, moreover, undertakes the labour with such hearty goodwill, that I fear the appearance even of undervaluing his disinterested aid.

The eastern ridge seems to bend in to the west at the part we have crossed, and then trends away to the north-east, thereby approaching the east coast. It is fringed on some parts by ranges of hills, but my observations seem to show they are not of greater altitude than the flats of Linyanti. I cannot hear of a hill *on* either ridge, hence the agricultural phrase I employ. And if the space between the ridges is generally not broader than 600 miles, instead of calling the continent basin-shaped, it may be proper to say that it has a furrow in the middle, with an elevated ridge on each side, each about 150 or 200 miles broad, the land sloping on both sides thence to the sea.

I have referred to the clay-shale, or "keel" formation, of which I got a glance in the western ridge. In the eastern we have a number of igneous rocks, with gneiss and mica-slate, all dipping westwards; then large rounded masses of granite, which appear to change the dip to the eastward. I bring specimens of .

both classes of rocks along with me. Is this granite the cause of elevation?

I shall refer to but one topic more and then conclude. The ridges are both known to be comparatively salubrious, closely resembling in this respect that most healthy of healthy climates, the interior of Southern Africa, adjacent to the desert. The grass is short; one can walk on it without that high, fatiguing lift of the foot necessary among the long tangled herbage of the valley. We saw neither fountain nor marsh on it; and, singularly enough, we noticed many of the plants and trees which we had observed on the slopes of the western ridge. In Angola, parts—which once were thought to be so unhealthy as to be set apart for the punishment of criminals of the deepest dye, and transportation there deemed much worse than to any part of the coast—are now known to be the most healthy spots in the country. Such are the “pedras negras,” or black rocks of Pungo Andongo, and other parts.

If my opinion were of any weight, I would fain recommend all visitors of the interior of Africa, whether for the advancement of scientific knowledge, or for the purposes of trade or benevolence, to endeavour to ascertain whether the elevated salubrious ridges mentioned are not prolonged farther north than my inquiries extend, and whether sanatoria may not be established on them. At present I have the prospect of water-carriage right up to the bottom of the eastern ridge. If a quick passage can be effected thither during a healthy part of the season, there is, I presume, a prospect of residence in localities superior to those on the coast. Did the Niger expedition turn back when near such a desirable position for its stricken and prostrate members?

I have said that the hills which fringe the ridge on the east are not of great altitude. They are all lower than the crest of the ridges, and bear evident marks of having been subjected to denudation on a grand scale. Many of the ranges show on their sides, in a magnified way, the exact counterparts of mud-banks left by the tides. A coarse sandstone rock which contains banks of shingle and pebbles, but no fossils, often exhibits circular holes, identical with those made by round stones in rapids and waterfalls. They are from 3 to 4 feet broad at the brim; wider internally, and 6 or 8 feet deep. Some are convenient wells, others are filled with earth; but there is no agency now in operation in the heights in which they appear which could have formed them. Close to the confluence of the Kafue there is a forest of silicified trees, many of which are 5 feet in diameter; and all along the Zambesi to this place, where the rock appears, fragments of silicified wood abound. I got a piece of palm, the pores filled with silica, and the woody parts with oxide of iron. I imagined it was

one of the old bottom rocks, because I never could see a fossil in it in the valley; but here (Tete and Naké Rt.) I find it overlying beds of coal! If it be not heresy for a mere learner to utter an opinion, I would suggest, from the bending in of the ridge, and the appearance of the country eastwards, that in ancient times this continent presented very much of the same bent form as the south-eastern coast of America does now.

DAVID LIVINGSTONE.

Temperature of the Average Point of
brisk Ebullition.

	°	Feet.
Linyanti	205½	3288
Bed of Lekoné River	204½	4078
Marimba's village	203½	4608
Unguesi River	202½	
Kalomo River	202	5278
Naka Chinto, on eastern slope	204	4210
Semalembue's, on Kafué River	205½	3415
Top of hill at Semalembue's	204½	4078
Down at bed of river 1 hour afterwards	205½	3288
Near confluence of Kafué and Zambesi	209	1571
Confluence of Loangwa and Zambesi = Zumbo	209½	1440

Note.—The observations were generally made at the same hour of the day, and when the temperature of the air in the shade was about 80°.—D. L.

3. *On the People of Southern Africa, with concluding Remarks.*

Teté or Nyungwé, River Zambesi, Africa,
4th March, 1856.

SIR,—Having arranged for the delay of the messenger for half a day more, I shall spend the time on this portion of my communication referring principally to the people of this part of Africa.

Perhaps nowhere else do hills seem to exert a more powerful and well-marked influence on national character than they do in Africa. Every one is aware of the brave resistance offered by the Caffre mountaineers to the British soldiers, than whom I believe there are none more brave beneath the sun. And the whole of the hill tribes, with but few exceptions, possess a similarity of character. They extend chiefly along the eastern side of the continent. Those among whom I have lately travelled have been fighting with the Portuguese for the last two years, and have actually kept the good men of Teté shut up in their fort during most of that time. They are a strong, muscular race, and, from constant work in the gardens, the men have hands like those of English ploughmen. Like hill people in general, they are much attached to the soil. Their laws are very stringent. The boundaries of the

lands of each are well defined, and, should an elephant be killed, the huntsman must wait till one comes from the lord of the land to give permission to cut it up. The underlying tusk and half of the carcase are likewise the property of him on whose soil the elephant fell. They may well love their land, for it yields abundance of grain, and here superior wheat and rice may be seen flourishing side by side. Their government is a sort of republican-feudalism, which has decided that no child of a chief can succeed his father. A system of separating the young men from their parents and relatives would have pleased the author of the *Cyropædia*: yet the frequent application of the ordeal to get rid of a wife no longer loved shows that Xenophon's beau idéal does not produce gallantry equal to that which emanates from the birch of a wrathful village dominie among ourselves. The country towards Mosambique supports people of similar warlike propensities; and if these are owing to an infusion of Arab blood in their veins, that mixture does not seem to have had much influence on their customs, for those are more negro than aught else. They all possess a very vivid impression of the agency of unseen spirits in human affairs, which I believe is especially characteristic of the true negro family.

Situated more towards the centre of the continent, we have the Bechuana tribes, who live generally on plains. Compared with the Caffre family, they are all effeminate and cowardly; yet even here we see courage manifested by those who inhabit a hill country. Witness, for example, Sebituane, who fought his way from the Basuto country to the Barotsé and to the Bashukulompo. Moshesh showed the same spirit lately in his encounter with English troops. These stand highest in the scale, and certain poor Bechuanas, named Bakalahari, are the lowest. The latter live on the desert, and some of their little villages extend down the Limpopo. They generally attach themselves to influential men in the Bechuana towns, who furnish them with dogs, spears, and tobacco, and in return receive the skins of such animals as they may kill either with the dogs or by means of pitfalls. They are all fond of agriculture, and some possess a few goats; but the generally hard fare which they endure makes them the most miserable objects to be met with in Africa. From the descriptions given in books, I imagine the thin legs and arms, large abdomens, and the lustreless eyes of their children, make the Bakalahari the counterparts of Australians.

Considerable confusion has been introduced in consequence of the indiscriminate use of the term "*Caffre*." It is an instance in which the use of a single word involves a very free use of the traveller's licence, for does it not appear presumptuous to speak of hunting, travelling, and sometimes talking big among thousands of

“Caffres,”—those “magnificent savages,” to wage war with whom Sir Harry Smith declared was like fighting with Circassians or Algerine Arabs? I never can repress a smile when Boers or Englishmen speak of the more abject of the Bechuanas as “Caffres.” The real Caffres or Zulu race are those who have banged about the English soldier so unceremoniously, and are as remarkable as New Zealanders for suffering no nonsense from either white or brown. This difference in national character explains at a glance why the tide of emigration spreads away from Caffreland towards the more central parts—in the Sovereignty and Cashan mountains. Oddly enough, among the very first articles of the political government of a republic on the plains is a law made for the punishment of cowardice! They, of course, know their own wants best.

But though it is all very well, in speaking in a loose way, to ascribe the development of national character to the physical features of the country, I suspect that those who are accustomed to curb the imagination in the severe way employed to test for truth in the physical sciences would attribute more to race or breed than to mere scenery. Look at the Bushmen—living on the same plains, eating the same food, but often in scantier measure, and subjected to the same climatorial and physical influences as the Bakalahari, yet how enormously different the results! The Bushman has a wiry, compact frame; is brave and independent; scorns to till the ground or keep domestic animals. The Bakalahari is spiritless and abject in demeanour and thought, delights in cultivating a little corn or pumpkins, or in rearing a few goats. Both races have been looking at the same scenes for centuries. Two or three Bechuanas from the towns enter the villages of the Bakalahari and pillage them of all their skins of animals without resistance. If by chance the Bechuanas stumble on a hamlet of Bushmen, they speak softly, and readily deliver up any tobacco they may have as a peace-offering, in dread of the poisoned arrow which may decide whether they spoke truly in saying they had none.

Again, look at the river Zouga, running through a part of the Bushman and Bakalahari desert. The Bayeiye or Bakoba live on its reedy islets, cultivate gardens, rear goats, fish and hunt alternately, and are generally possessed of considerable muscular development. Wherever you meet them they are always the same. They are the Quakers of the body politic in Africa. They never fought with any one, but invariably submitted to whoever conquered the lands adjacent to their rivers. They say their progenitors made bows of the castor-oil plant, and they broke; “therefore (!) they resolved never to fight any more.” They never acquire much property, for every one turns aside into their

villages to eat what he can find. I have been in their canoes and found the pots boiling briskly until we came near to the villages. Having dined, we then entered with the pots empty, and looking quite innocently on any strangers who happened to drop in to dinner. Contrast these Friends with the lords of the isles, Sekote and others, living among identical circumstances, and ornamenting their dwellings with human skulls.

The cause of the difference observed in tribes inhabiting the same localities, though it spoils the poetry of the thing, consists in certain spots being the choice of the race or family. So when we see certain characters assembled on particular spots, it may be more precise to say we see the antecedent disposition manifested in the selection, rather than that the part chosen produced a subsequent disposition. This may be evident when I say that, in the case of the Bakalahari and Bushmen, we have instances of compulsion and choice. The Bakalahari were the first body of Bechuana emigrants who came into the country. They possessed large herds of very long-horned cattle, the remains of which are now at Ngami. A second migration of Bechuanas deprived them of their cattle and drove them into the desert. They still cleave most tenaciously to the tastes of their race. While, for the Bushman, the desert is his choice, and ever has been from near the Coanza to the Cape. When we see a choice fallen on mountains, it means only that the race meant to defend itself. Their progenitors recognised the principle, acknowledged universally, except when Caffre police or Hottentots rebel, viz. that none deserve liberty except those who are willing to fight for it. This principle gathers strength from locality, tradition develops it more and more, yet still I think the principle was first, foremost, and alone vital.

In reference to the origin of all these tribes, I feel fully convinced, from the very great similarity in all their dialects, that they are essentially one race of men: the structure, or we may say the skeletons, of the dialects of Caffre, Bechuana, Bayeiye, Barotse, Batoka, Batonga or people of the Zambesi, Mashona, Babisa, the negroes of Londa, Angola, and people on the west coast, are all wonderfully alike. A great proportion of the roots is identical in all.

The Bushman tongue seems an exception, but this, from the little I can collect of it, is more apparent than real. While all the others are developed in one and nearly the same direction, this deviates into a series of remarkable clicks. The syllable on which, in other dialects, the chief emphasis is put, in this sometimes constitutes the whole word. But though the variations lie in clicks, the development is greater than in the other dialects. They have, for instance, the singular, plural, and dual numbers;

the masculine, feminine, and neuter genders ; and the aōrist tense ; which the others have not.

It may be gratifying for you to hear that the Bible is nearly all translated into Sichuana—the dialect of the Bechuanas, and the most regularly developed of all negro languages. Of its capabilities you may judge, when I mention that the Pentateuch is fully expressed in considerably fewer words than in the Greek Septuagint, and in a very large number less than in our verbose English. Of its copiousness I cannot well speak, for I have been learning it for fifteen years, and others have been doing so for double that time, and we hear new words every day or two. It is fortunate so many are now secured ; and others not in the language, or in any language, till the ideas are taken from the sacred oracles, are adopted into the language ; for, people born in the country, though they speak it without foreign accent, and even natives in contact with Europeans, are remarkable for the scantiness of their vocabularies.

In the animal kingdom there are three antelopes which, I believe, have been hitherto unknown, all of which abound in the great valley, but nowhere else. One is specially adapted for treading on mud and marshy spots, by great length from point of toe to the little hoofs above the fetlock. It has a heavy gait, looks paunchy, and hides itself all but the nose in water. I wished to name it after Captain Vardon, my warm friend, and a participator in discovery in Africa, but I could not bring any skin for want of tin boxes. Tropical rains go through everything else. Will the Zoological Society gratify me in this ? I will send it when I can. Its native name is Nakong or Setutunka.

Another little antelope abounds in great numbers near Seshéke ; its cry of alarm is like that of the domestic fowl. It is called Thianyané. The third is named Poku, and it abounds in prodigious numbers above the Barotse. It is exactly like the Leche which was discovered when we went first to Lake Ngami, but considerably smaller in every way, and of a redder colour. It seems to be an instance of the application of the law which has determined larger development for animals in the more temperate and colder parts of the continent, than in the hot equatorial regions, where food abounds in lavish profusion. This is different from Mr. Bachman's theory, but I have no doubt as to the existence of the law. A full-grown elephant here, for instance, measures quite two feet less than a similar animal does on the Limpopo or at Kolobeng, though the smaller animal carries the largest ivory.

I never before saw elephants so numerous or so tame as at the confluence of the Kafue and Zambesi. Buffaloes, zebras, pigs,

and hippopotami, were equally so, and it seemed as if we had got back to the time when megatheriæ roamed about undisturbed by man. We had to shout to them to get out of the way, and then their second thoughts were—"It's a trick," "We're surrounded"—and back they came, tearing through our long-extended line. Lions and hyænas are so numerous that all the huts in the gardens are built on trees, and the people never go half a mile into the woods alone. One of our best men ran off, we believe, in a fit of insanity during the night, and we never found a trace of him.

We have no reason to complain of the treatment we have met on the Zambesi. The inhabitants have plenty of grain, and were never stingy with it. Had it been otherwise we should have starved. If spared to return I will pay *them* again, and not as those do who publish in their books that they gave "three buttons," or a "cotton handkerchief," in return for handsome presents of food. They believed our statements of everything being expended until close to Teté, and as they levy tribute on traders we found great difficulty in getting along. Are they worse thus, only where they know us Christians best? We do not seem to convey a favourable idea of our blessed Christianity to the heathen. Do we?

With respect to the perpetuity of the African race, we have a stronger hope than in the case of the South Sea Islanders, and other savage nations in contact with Europeans. The well-known preference that fever manifests for the natives of Northern Europe, and the indisposition it exhibits to make victims of Africans, would lead persons resident in one region of this continent to say that the white race was doomed to extinction. However to be explained, the Africans who have come under my observation are not subject to many of the diseases which thin our own numbers. Smallpox and measles paid a passing visit through the continent some thirty years ago; and though they committed great ravages, they did not remain endemic nor return. They did not find a congenial soil; and though the period preceding the rains is eminently epidemic in its constitution, excepting hooping cough, no epidemic known in Europe appears. That there is an indisposition independent of climatic influences, becomes, I imagine, evident, when the venereal disease is observed to die out spontaneously in Africans of pure blood; and those of mixed blood are subjected to all its forms with a virulence exactly proportioned to the amount of European blood in their veins.

Tending in the same way as this indisposition to diseases which decimate tribes which are passing away, is the fact that the Africans are wonderfully prolific. The Bushmen are equally so, but the Bechuanas are an exception which the introduction of

Christianity may remove. As this has not, it is reported, happened in the Pacific, the data on which our hopes are founded may prove deceptive.

My present party amounts to 110 or 112, and I have taken ivory enough to purchase a long list of articles for Sekelétu. I could scarcely do less in return for all his kindness to me, and it will be initiating his people into trade at the same time. I expect to find employment for the men when nearer the sea, in order that they may support themselves and save a little for their return during my absence in England. The prospect of coming down to trade in canoes is to them so feasible that all are delighted with it. I have not seen a rapid which would delay the Makololo a day. Had I not been obliged to part with the price of the canoe I should have examined all minutely. At present I am indulging the belief that we have water carriage all the way to the foot of the eastern ridge, and should the Makololo come nearer we shall not be quite so much out of the world as we have been.

It may be proper to refer to what has been done in former times in the way of crossing the continent, though my inquiries lead to the belief that the honour belongs to our country. The Portuguese invariably applaud any little ebullition of patriotic feeling they observe in me, and I cannot but participate in their feelings, when in the history of Angola proud mention is made of the brave attempt of Captain José da Roza, in 1678, to penetrate from Benguela to the Rio da Senna (Zambesi). He was forced to retire after exploring a large tract of new country. In 1800 the project was again revived by the energetic Dr. Lacerda, who recommended the erection of a chain of forts along the banks of the Coanza, whereby to effect a line of communication between the west and east coasts. This showed a mistaken idea of the source of the Coanza, as it arises near Bihé, west of the western ridge. But a communication having been made a few years afterwards by some native traders with the Moluas (Balonda), the government of Angola was gratified in 1815 by the arrival of two persons (*feirantes pretos*), named Pedro Jacoá Baptista and Antonio José, with letters from the governor of Mosambique, "proving thereby," as stated in the government document of the day, "the possibility of so important a communication." Certain Arabs too, a few years before my visit to Loanda, came from the opposite coast to Benguela, and with a view to improve the event the government of Angola offered one million of reis (about 142*l.*), and an honorary captaincy in the Portuguese army, to any one who would accompany them back, but no one went. The journey will now be performed by Ben Habib. Pereira, and others, visited Cazembe, and Senhor Graça visited Matiamvo. If I knew that

any one else had done more, or that any *European* had ever before crossed the continent, I would certainly mention it.* I cannot find a trace of a road from Caconda either.

I feel most thankful to God, who has prolonged my life, while so many who would have done more good have been cut off. But I am not so much elated as might have been expected, for the end of the geographical feat is but the beginning of the missionary enterprise. Geographers labouring to make men better acquainted with each other, soldiers fighting against oppression, and sailors rescuing captives in deadly climes—are all, as well as missionaries, aiding in hastening on a glorious consummation of all God's dealings to man. In the hope that I may yet be permitted to do some good to this poor long trodden-down Africa, the gentlemen over whom you have the honour to preside will, I doubt not, all cordially join.

DAVID LIVINGSTONE.

4. *On the lower Part of Zambesi.*

Quilimane, East Africa, 23rd May, 1856.

SIR,—A packet of letters sent from Teté to the care of Mr. Maclear contained some information addressed to you respecting this noble Zambesi, towards the interior. As I remained six weeks with the excellent commandant, Major T. A. d' A. Secard, who generously advised me thus to avoid the delta at Quilimane until the commencement of the healthy season in April, I had an opportunity of gleaningsome knowledge of the adjacent country while recovering from the effects of my march on foot; and I mean, in this communication, to give the most trustworthy of my gleanings concerning the eastern or lower portion of the same river.

Strangers are so liable to be unintentionally misled by the careless answers of uninterested inhabitants, I would fain have subjected every important point to the test of personal examination, but except in the cases of gold, coal, iron, and a hot fountain, which did not involve any additional fatigue, I had to rely on the information of others alone. The difference of climate must account for the disproportionate exhaustion experienced by myself and companions from marches of a dozen miles, compared with that produced in our naval officers by those prodigious strides we read of having been performed in the Arctic Circle. Indeed I was pretty well "knocked up" by not much more than a month on foot; the climate on the river felt hot and steamy, water never cool, clothes always damp from profuse perspiration; and as the country is generally covered with long grass, bushes, and trees, the abundance

* See Mr. Macqueen's Papers, R. G. S. Journal, vol. xxvi.

of well-rounded shingle everywhere renders it necessary to keep the eyes continually on the ground. Pedestrianism under such circumstances might be all very well for those whose obesity calls for the process of Pressnitz ; but for one who had become as lean as a lath, the only discernible good was that it enabled an honest sort of man to gain a vivid idea of " a month on the treadmill."

Looking down the Zambesi from those remarkable falls, which I think ought to be named after our Queen, " the smoke-sounding falls of Victoria," the river is seen fringed on both sides by ranges of hills from 800 to 1000 feet in height. On the right or southern bank the hills cease at Lupata ; but on the left they run along to Sena, terminating in the fine high mountain Morumbala, which has a hot sulphureous fountain on its northern summit. A very large number of conical-shaped hills ornament the ranges ; and as all are covered to their tops with fine leafy trees and patches of lighter green grass between, the scenery is always pleasing ; it was particularly so in my voyage down from Teté, for winter having commenced the foliage had changed into the most varied hues before-falling. Some were inky black, others copper-coloured, and others of so bright an orange that I have turned aside to them in the belief that they were masses of flowers.

At this season, also, the stimulus of cold acts like that of heat on birds in our climate. " The time of the singing of birds had come." It is far from true that the birds of at least this portion of the Tropics are unmusical ; they have wanted poets only to bring them into notice, as ours have had from the time of Aristophanes to the present day.

The river Zambesi itself is magnificent, until spoiled by spreading out in this sickly delta. Measured at the fort of Teté, it was found to be 500 fathoms or 1000 yards broad, and that is a narrow part. Below Lupata it spreads among large, reedy islands, to a breadth from 1 to 2 or more miles.

It has been in flood ever since we struck it in December last, and it looks as if it would remain high for more than a month to come. These five months of high water show the statement to be substantially correct that it is navigable for considerable-sized launches for half the year. Three and occasionally four freshets occur annually at Teté. The flood of northern waters, which inundates the Barotse and Seshéke valleys, comes into the Makololo country in February ; the flood of the Chobé is always a month later, on account of the impediment which the extreme tortuosity of the river's bed presents to its flow. It is often heard of as spreading over the lands 30 or 40 miles above Linyanti a fortnight before it floods that place. In the case of the rivers of Libébé Teoughe, Zō or Tzō, and Tamunakle, the flood descends sometimes in April, at other times much later, but it is not capable of

making an inundation except in the country near Libébé, as it is discharged into the lake till that is full—the surplus finding its way down the Zouga to Kumadau, and a little way beyond.

The water in these floods is in all cases perfectly clear; this peculiarity enabled me to distinguish the water of the valley inundations in a large rise of the river which took place at Teté in the beginning of March. To the inhabitants it seemed the third freshet of that year; but the water being comparatively limpid enabled me to connect it with the overflowing at Sesheké in February. The two previous floods, produced by rains falling east of the eastern ridge, imparted a deep reddish-brown tinge to the Zambesi. This flood had but a partial discolouration effected by the numerous feeders of the Zambesi continuing to pour in some muddy water, until the winter began in April; and, as they are very numerous above Teté, we perceive the reason why the remarkable floods of the clear water of the great interior valley have not been noticed farther down.

I am aware of no obstruction to navigation from the bottom of the eastern ridge to the delta, except one named Kebrabasa, about 30 miles above Teté. There a number of jagged rocks jut out of the stream right across the river, forming in high water a dangerous rapid; and at low water the flow is so zigzag that the canoes must be taken ashore and hauled along the bank. It is near the district called Chicova; but, being on foot when we came near that point, we were obliged to leave the river to avoid crossing the troublesome rivulets which the Zambesi in its rise had filled: and we did not know till we arrived at Teté that we had thereby missed the opportunity of examining the only impediment we are likely to meet with in our returning upward course.

Above Lupata, which is about 40 miles below Teté, the river is kept rather narrow by the hills and rocks on its banks; it may be said to be from 1000 to 1200 yards broad. The current is $3\frac{1}{2}$ miles per hour. The gorge of Lupata is about 200 or 300 yards wide, 12 miles in length, and rather winding, but so deep close to its rocky perpendicular banks that a large steam-ship could pass through at full speed.

Below Lupata the river becomes very broad, and full of large, reedy islands, which prevent one from seeing the banks. I conjectured the breadth from occasional glimpses of dark, low-lying woodland on the south, and the ranges of Maganja hills on the north. A sailing vessel would now have more room to tack in here than in the Clyde above Greenock. I, however, saw it only when the river was full.

In the dry season it presents a very different appearance, but it is never without a very large volume of water, flowing in a somewhat winding channel. But though both channel and islands

change their positions from time to time, according to the swing and force of the full flood, free passage is always afforded for launches and large canoes, and the river is never fordable.

Minute interrogation leads me to believe that a steamer of light draught could ply on the Zambesi during the greatest part of the year; but the opinion of a seaman might be very different. Our surveyors, however, and visitors to Quilimane have had but little opportunity of knowing the capabilities of the river; for that which is called the river of Quilimane no more deserves the name of Zambesi, than does the Serpentine that of the Thames. Its proper name is "Mutu," and the point of departure from the main stream "Mazaro," or "mouth of Mutu." Mazaro may thus be considered the beginning of the Quilimane delta, as the Mutu, though small, is the first branch which leaves the Zambesi for the sea. Its claims may be understood when I mention that even now, when the water is at its greatest height, the upper part of the Mutu is only three or four yards broad. It is also very winding, and so full of reeds and water-plants, together with overhanging branches of trees, that a small canoe even can with difficulty pass along. During a great part of the year it is dry, rendering it necessary to employ land-carriage for 12 or 15 miles in the case of all commerce to and from Quilimane and the interior. Beyond the part which annually stands dry, the Mutu receives two rivers from the north, called Pingazi and Luala, which make it navigable. Another farther down, named Likwaré, and the tides, contribute to form the river of Quilimane. The bar at its entrance is very dangerous, as it admits small vessels only twice a month, and it is a common remark that but few of these go both in and out unscathed. This bar embittered the joy I might otherwise have felt on gaining the eastern coast, for on approaching Quilimane the sad news was communicated that eight of my countrymen, in coming from H. M. brigantine Dart to offer me a passage homewards, had unfortunately lost their lives. It caused me the most poignant sorrow, and made me feel as if it would have been easier for me to have died for them than to bear the thought of so many being cut off from all the joys of life in generously endeavouring to render me a service.

The Portuguese, in extenuation of the apparent disadvantage of building the "capital of the rivers of Seña" (Quilimane) where it possesses such slender connection with the Zambesi, allege that the Mutu in former times was large, but is now filled up with alluvial deposit. The bar, too, was safer then than it is now. To a stranger it looks remarkable that the main stream of the Zambesi, sometimes called Cuama and Luabo, which is, at least, three quarters of a mile broad at the mouth of the Mutu, should be left to roll on to the ocean unused. It divides, it is true, below that

into six or seven branches ; but two of these, named, near the sea, Melambe and Catrina, present comparatively safe harbours at their mouths and free passage into the interior for large launches during the entire year. These harbours are not more insalubrious than Quilimane and Seña.

With respect to Quilimane, one could scarcely have found a more man-killing spot than it. The village is placed on a large mud-bank, so moist that water is found by digging two feet deep, and it is surrounded by mango-bushes and marsh. The walls of the houses, too, sink gradually, so as to jam the doors against the floors. That the subject of securing a better harbour for the commerce of the magnificent country drained by the Zambesi merits the attention of the Portuguese Government, as interested in its prosperity, a glance at the articles which might be exported to a great amount will sufficiently show.

If we again fancy ourselves looking down the Zambesi, from its confluence with the river Loangwa, we find that a soft grey sandstone rock, with many silicified trees and palms on the surface, forms, to use an ungeological expression, the flooring of the country all the way to Lupata. This space, a trapezoid in form, extends 3° of longitude and 2° or more of latitude, and is, if I am not mistaken, a field of coal ; for the rock is in many places cut through and dislocated by dykes of greenstone and basalt. There are also broad bands of gneiss and porphyry, with hills of baked clay and igneous rocks, containing much silica and mica.

Coal.—The disturbances effected by the eruptive rocks in the grey sandstone have brought many seams of coal to the surface. There are no fewer than nine of these in the country adjacent to Teté, and I came upon two before reaching that point. One seam in the rivulet Muatize is 58 inches in diameter ; another is exposed in the Morongoze, which, as well as the Muatize, falls into the Revubue, and that joins the Zambesi from the north about two miles below Teté. The Revubue is navigable for canoes during the whole year, and but for a small rapid in it, near the points of junction with these rivulets, canoes might be loaded at the seams themselves. Some of the rocks have been ejected in a hot state since the deposition of the coal, for it is seen in some spots converted into coke, and about 10 miles above Teté there is a hot fountain emitting abundance of acrid steam ; the water at the point of emergence is 158° Fahr., and when the thermometer is held in it half a minute it shows steadily 160° . When frogs or fish leap into it from the rivulet in which it is situated, they become cooked, and the surrounding stones were much too hot for the bare feet of my companions.

The remarks about the absence of any tradition of earthquakes in my last letter must be understood in reference to the country

between the ridges alone, for I find that shocks have frequently been felt in the country of the Maravi, and also at Mosambique, but all have been of short duration, and appeared to pass from east to west.

Iron.—In addition to coal, we have iron of excellent quality in many parts of the country. It seems to have been well roasted in the operations of nature, for it occurs in tears or rounded masses, admitting of easy excavation with pointed sticks, and it shows veins of the pure metal in its substance. When smelted it closely resembles the best Swedish iron in colour and toughness. I have seen assegais made of it strike the crania of hippopotami and curl up instead of breaking, the owner afterwards preparing it for further use by straightening it, while cold, with two stones.

Gold.—If we consider Tete as occupying a somewhat central position in the coal-field, and extend the leg of the compasses about $3\frac{1}{4}^{\circ}$, the line which may then be described from north-east round by west to south-east nearly touches or includes all the district as yet known to yield the precious metal. We have five well-known gold-washings from north-east to north-west. There is Abutua, not now known, but it must have been in the west or south-west, probably on the flank of the eastern ridge. Then the country of the Bazizula, or Mashona, on the south, and Manica on the south-east. The rivers Mazoe, Luia, and Luenya in the south, and several rivulets in the north, bring gold into the coal-field with their sands; but from much trituration it is generally in such minute scales as would render amalgamation with mercury necessary to give it weight in the sand, and render the washing profitable. The metal in some parts in the north is found in red clay-shale which is soft enough to allow the women to pound it in wooden mortars previous to washing. At Mashinga it occurs in white quartz. Some of the specimens of gold which I have seen from Manica and the country of Bazizula (Mosusurus!) was as large as grains of wheat, and those from rivers nearer Tete were extremely minute dust only. I was thus led to conclude that the latter was affected by transport, and the former showed the true gold-field as indicated by the semicircle. Was the eastern ridge the source of the gold, seeing it is now found not far from its eastern flank?

We have then at present a coal-field surrounded by gold, with abundance of wood, water, and provisions—a combination of advantages met with neither in Australia nor California. In former times the Portuguese traders went to the washings accompanied by great numbers of slaves, and continued there until their goods were expended in purchasing food for the washers. The chief in whose lands they laboured expected a small present—one pound's worth of cloth perhaps—for the privilege. But the goods

spent in purchasing food from the tribe was also considered advantageous for the general good, and all were eager for these visits. It is so now in some quarters, but the witchery of slave-trading led to the withdrawal of industry from gold-washing and every other source of wealth; and from 130 or 140 lbs. weight annually, the produce has dwindled down to 8 or 10 lbs. only. This comes from independent natives, who wash at their own convenience, and for their own profit.

A curious superstition tends to diminish the quantity which might be realised. No native will dig deeper than his chin, from a dread of the earth falling in and killing him; and on finding a piece of gold it is buried again, from an idea that without this "seed" the washing would ever afterwards prove unproductive. I could not for some time credit this in people who know right well the value of the metal; but it is universally asserted by the Portuguese, who are intimately acquainted with their language and modes of thought. It may have been the sly invention of some rogue among them, who wished to baulk the chiefs of their perquisites, for in more remote times these pieces were all claimed by them.

Agriculture.—The soil formed by the disintegration of igneous rocks is amazingly fertile, and the people are all fond of agriculture. I have seen maize of nearly the same size of grain as that sold by the Americans for seed in Cape Town. Wheat, for which one entertains such a friendly feeling, grows admirably near Teté, in parts which have been flooded by the Zambesi, and it doubles the size of the grain at Zumbo. When the water retires the sowing commences. A hole is made with a small hoe, a few grains dropped in, and the earth pushed back with the foot. This simple process represents all our draining, liming, subsoil-ploughing, &c.; for with one weeding a fine crop is ready for the sickle in four months afterwards.

Wheat, sugar, rice, oil, and indigo were once exported in considerable quantities from Teté. Cotton is still cultivated, but only for native manufacture. Indigo of a large kind grows wild all over the country. There are forests of a tree which acts as the cinchona near Senna. Does not this show the Divine care over us?—where fever prevails the remedy abounds. We have also sarsaparilla, calumba-root, and senna-leaves in abundance; the last I believe to be the same as is exported from Egypt.

It may not be out of place here to call attention to native medicines as worthy the investigation of travellers. I have always had to regret the want of time to ascertain which were efficacious and which were not, and whether there are any superior to our own. It is worthy of note that the bark, which is similar in properties to that which yields the quinine, has been known as a

potent febrifuge by the natives from time immemorial. Our knowledge of the virtues of the bark is comparatively recent. Some may think we have more medicines in the Pharmacopœia than we know well how to use, but the fact of well-educated persons resorting to Homœopathy, Holloway's ointment, Morison's pills, and other nostrums, may indicate an actual want, to be supplied by something more potent than either raillery or argument. Few such I imagine would in cool blood prefer Parr's life pills to quinine in intermittent fever; and if we had a remedy for cholera only half as efficacious as quinine in Quilimane fever, it would be esteemed a universal blessing. Many native remedies are valueless, perhaps the majority are so; but they can cure wounds inflicted by poisoned arrows. In Inhambane and Delagoa Bay a kind of croup prevails: it is probably the *Laringismus stridulus*, as it attacked and proved very fatal to adults. Singularly enough, it was unknown till the first visit of Potgeiter's Boers to Delagoa Bay, who brought it from parts to the south-west where it prevails, and left it there, though none of them were suffering from it at the time. It is still unknown here. This case is analogous to ships leaving diseases at the South Sea Islands. After many had perished, a native doctor pointed out a root which, when used in time, effects a speedy cure. The Portuguese now know the remedy and value it highly. I am not disposed to believe everything marvellous; but from excoriations having been made, by means of the root, on the tongue of the patient, and abstraction of blood so near the seat of the disease having been successful in this very intractable disease, I think the black doctor deserves some credit. The fact, too, that certain plants are known by widely separated tribes all over the country as medicinal, is an additional reason for recommending those who have nothing but travel and discovery on hand to pick up whatever fragments of aboriginal medical knowledge may come in their way.

In addition to the articles of commerce mentioned above, I saw specimens of gum copal, orchilla-weed, caoutchouc, and other gums. There are two plants, the fibres of which yield very strong thread and ropes. Bees abound beyond Tete, but the people eat the honey and throw the wax away. There are several varieties of trees which attain large dimensions, yielding timber of superior quality for durability in shipbuilding. I saw pure negroes at Seña cutting down such trees in the forest, and building boats on the European model, without the superintendence of a master. Other articles of trade are mentioned by writers, but I refer to those only which came under my personal observation.

I feel fully persuaded that, were a stimulus given to the commerce of the Zambesi by a small mercantile company proceeding

cautiously to develop the resources of this rich and fertile country, it would certainly lead to a most lucrative trade. The drawbacks to everything of this sort must, however, be explicitly stated; and though anxious to promote the welfare of the teeming population of the interior by means of the commercial prosperity and intercourse of the coasts, I should greatly regret any undue expectations from unconsciously giving a too high colouring to my descriptions. I shall therefore try to explain the causes of the miserable state of stagnation and decay in which I found the Portuguese possessions.

I have already stated that the slave-trade acted by withdrawing labour from every other source of wealth in this country, and transferring it to the plantations of Cuba and Brazil. The masters soon followed the slaves; hence this part of Africa contains scarcely any Europeans possessing capital and intelligence or commercial enterprise. Of those who engaged in the slave-trade in both eastern and western Africa, it is really astonishing to observe how few have been permanently enriched by it. There seems a sort of fatality attending these unlawful gains, for you again and again hear the remark, "*He was rich in the time of the slave-trade.*" Beyond all question, it has impoverished both the colonists and the country. And when our cruizers, by their indomitable energy, rendered the traffic much more perilous than any other form of gambling for money, they conferred a double benefit. The slave was prevented from being torn from his home and country, and the master was compelled to turn to more stable sources of income and wealth. But when this took place it was found that the strong arms which washed for gold and cultivated coffee, cotton, wheat, indigo, sugar, earthnuts for oil, &c., were across the Atlantic, and a civil war breaking out completed the disorder.

On the south bank of the Zambesi, Nyande, a man of Portuguese and Asiatic extraction, rebelled and collected a band of every shade of bad character in the country. Building a stockade at the confluence of the Luenya and Zambesi, below Tete, he could rob every vessel that came up the river; for the Luenya rushes with great force into the Zambesi, and in order to avoid being carried to the opposite rocky bank by the current it is necessary to ascend the Luenya first and cross it at a point which will ensure the boat being carried not more than half-way across the river into which it rushes; in doing so the vessel comes right to the stockade of Nyande. This rebel burned nearly all the houses of Tete.

On the northern bank another of Portuguese extraction rebelled and burned all the rich villas to which the merchants were wont to retire for ease and pleasure. These rebels, though not in

alliance with each other, kept the loyal inhabitants of Tete shut up in their fort for two whole years; and so strict was the blockade that they were unable to get goods from the coast for trade, and scarcely enough for the purchase of food even. They had also to endure the usual lot of adversity; friends not only became cool, but often turned enemies. A neighbouring chief of no great power, whose predecessor rejoiced in the name of the "Emperor Monomotapa," was one of the latter. Real Caffres or Zulus, here named Landeens, overran many districts of the country: they attacked Seña, and more than once since have compelled the inhabitants to pay tribute. The rebels have not been punished.

In coming down the river I passed the stockade of Nyande; and, in consequence of a note from Major Secard, I was kindly received by his (Nyande's) son-in-law, who entertained me to dinner and breakfast, and added some goats to our provisions for the voyage. It speaks well for this worthy commandant that the natives hold him in so much respect, his simple presence has put a stop to hostilities four times. His generous hospitality to myself and large party demands my lasting gratitude.

These notices of the war are not intended to inculcate either party; a passing stranger can scarcely form a correct judgment, especially if he espouses either side; they are given in order that the stagnation of trade may be understood.

When the influence of the white man was at its lowest ebb among the natives, we happened to come down the river. The people possess more of the Caffre than Bechuana character. An Italian had ascended the river, with about fifty followers armed with guns, some months before our visit, and committed great havoc on some defenceless villages. On returning a number of tribes united and destroyed both him and his force. We were in some danger from a chief spreading the report in our front that we had committed similar deeds to those of the Italian; and many bands of armed men were observed collecting to award us a like treatment. Our explanations were, however, considered satisfactory; indeed, when we could get a palaver, they were never unreasonable until we came close to Tete; but it was unpleasant to be everywhere suspected. The men belonging to some chiefs on the Zambesi never came near us unless fully armed; others would not sit down, nor enter into any conversation, but after gazing at us for some time with a sort of horror they went off to tell the chief and great men what they had seen. We appeared an uncouth band, for the bits of skins, *alias* fig-leaves, had in many cases disappeared, and my poor fellows could not move about without shocking the feelings of the well-clothed Zambesians. The Babisa traders (Muizas) bring large quantities of cotton cloth from the coast to the tribes beyond Zumbo. Both

Moors and Babisa had lately been plundered too. They could not have taken much from us, for the reason contained in the native proverb, "You cannot catch a humble cow by the horns."* We often expected bad treatment, but various circumstances conspired to turn them from their purposes.

It is impossible to enumerate all the incidents which, through the influence of our Divine protector on the hearts of the heathen, led to our parting in friendship with those whom we met with very different sentiments; but I must not omit the fact that, if our cruizers had accomplished nothing else, they have managed to confer a good name on our country. I was quite astonished to find how far the prestige had spread into the continent; and in my case they had ocular demonstration of more than a hundred evidently very poor men going with one of "that white tribe" without either whip or chain. My headman speaks the language perfectly, and being an intelligent person he contributed much by sensible explanations to lull suspicion. We had besides no shields with us; this was often spoken of, and taken as evidence of friendly intentions; and for those who perversely insisted that we were spies, we had forty or fifty gallant young elephant-hunters, and the extraordinary bravery they sometimes exhibited seemed to say it would scarcely be wholesome to meddle with such fellows. The personal character of some chiefs led at once to terms of friendship. With others we spent much time in labouring in vain to convince them we were not rogues and vagabonds: they were in the minority, as the utterly bad are everywhere else. With fair treatment the inhabitants on the Zambesi would, I believe, act justly; they are not powerful as compared with our Caffres of the Cape. The so-called emperors, as Monomotapa, Cazembe, &c., are not so powerful as Sandillah and Moshesh.

Some of the Batonga and many of the Maravi women have an ugly custom of piercing the upper lip below the nose, and of inserting a shell or reed, so as to widen and draw out the orifice until it is quite an inch beyond the perpendicular of the nose. Fashion never induced a freak more mad. It looks as if they thought that female beauty of lip had been attained by the *ornithorynchus paradoxus* alone. Lower down the river they insert a button only, and they possess much influence. My men thought they used their power very creditably when they said, "Dance, and we will grind corn for you."

I shall notice but one point more. Lupata is mentioned as 40 miles below Teté. The range has a gorge in it through which the Zambesi flows. There is a perpendicular wall and an island

* Synonymous with the Scotch proverb, "You can't take the breeches off a Highlander."

on the left of the western entrance. This island was called the "Island of Mosambique," by Dr. Lacerda, from a belief that it stands on the same latitude with that settlement, viz. $15^{\circ} 1' S$. I found it to be $16^{\circ} 34' S$. I have no wish to prove that worthy gentleman wrong, but all my observations are erroneous if he is right. I found Teté to be in $16^{\circ} 8' 48''$, and an island below Lupata $17^{\circ} 0' 30''$.

It is always an ungracious task to find fault with others, but I am obliged to perform the duty in the case of this same Lupata. The word is nearly synonymous with Litako, anglicised into Lattakoo (now Kuruman), viz. walls, or rather dry stone dykes. Pata, or 'mpata, is applied to any defile in hills, particularly if it has perpendicular or wall-like sides. There is one called Mpata, through which the Zambesi comes, near Zumbo. The person who first wrote Lupata, or "*spine of the world*," Tala Mungongo, "*or castle of rocks*," did not mean, I hope, that the underlined sentences were translations, but only more poetic names—for the one means "walls," and the other "Behold the range." This range (Lupata) was said to be so high that snow lay on it during most of the year, and to consist of marble of great value. We slept a night on the island of Mosambique at the western entrance, where there is a fine view of the highest part in the whole range, viz. the right wall. It is perpendicular, and appears scarcely so high as Arthur's Seat, when viewed from about Prince's Street, Edinburgh! I question if it is more than 700 feet high from the river at its base, though it may be 800 or 900 feet above the level of the sea. The island is composed of a light-coloured compact silicious schist, which may have been rent off from the opposite wall; for the strata are all huddled and twisted together as if it had been roughly handled when soft. At the eastern entrance there are three conical hills of porphyry, with fine square and rounded crystals.

The northern part of Lupata range extends into the Maganja country, and then bends round to Seña. The southern part of the same range is rather crooked too, for it runs south and south-east, ending in Nyamonga and Gorongozo mountains, which may be seen from the top of a hill (Baramuana) behind Seña. When Lupata is seen from the east it looks decidedly lower than the Campsie range, as viewed from the vale of Clyde.

The southern end of the range bears south-west from the hill Baramuana, which is about half a mile west of Seña. The intervening country is flat, but well wooded with cumbanzo and other trees. The nearest point of the range is named Nyamonga, Gorongozo being a little beyond it: the latter is famed for its salubrity and crystal waters. The Jesuits once had a station there, and I have observed that they always showed great judgment and taste in the selection of sites. They were rich, having been keen

traders as well as laborious teachers, and could allow their brethren to follow their laudable tastes. On the top of Gorongozo there are several large slabs, or the rocks have been chiselled to appear so, and inscriptions are graven upon them; they are asserted to be in Roman characters. The Portuguese who have seen them not knowing the words (I presume they are in Latin, and the work of the Jesuit fathers), I at first formed the idea of their being in unknown characters, perhaps of a primitive language, or graven by the servants of Solomon the son of David, in their visits to Ophir. After patient inquiry, the assertion that all knew the letters, though not the meaning, made me conclude that the inscriptions are of no great antiquity. Ophir may be sought for near Sofala, but not on the Zambesi; for if the Delta was of old as unhealthy as it is now, Solomon's servants would get a larger share of fever than of gold. Except at a few points the river does not touch the gold-field, and there are no inscriptions or buildings showing antiquity on its banks.

With Sofala it is different, for between that fort and Manica we have the finest gold-field in Africa; and at the foundation of the fort itself articles of *wrought* gold have frequently been found. Such, also, have been picked up in a stream on the main land, and remnants of walls of hewn stone have been exposed in gardens. But the Landeens are there the lords of the soil, and Ophir must remain an open question.

DAVID LIVINGSTONE.

Mauritius, 26th August.

Brought to this island by H. M. brig "Frolic," Commander Peyton, on the 12th—a service for which I feel unfeignedly thankful to the Government of her Majesty. The "Frolic" was just in time to save the lives of the crew of a Hamburgh vessel lost near Quilimane. Another month of the climate would have been fatal to the whole. I reached Quilimane labouring under a severe tertian, but found that Captain Nolloth, R.N., late of the "Frolic," had left me some wine; and his surgeon, Dr. Walsh, some quinine—which, with the sympathy and encouragement expressed in letters from my former instructors in Glasgow University, from Commodore Trotter, and from yourself, soon restored me to my wonted vigour. I was most hospitably entertained in Quilimane by Colonel Galdino José Nunes, and here by our countryman the Hon. Major-General Hay. A short residence in his house enables me to announce the departure of an affection of the spleen which clung to me in spite of the comforts and friendship of the officers of

the "Frolic;" and I believe there is still some African service in me. My late companions, 110 in number, await my return at Tete (Tett).

I proceed by the overland route to England in September next, and hope to return so as to pass the Quilimane delta between April and August, 1857.

The headman of the party accompanied me on board the "Frolic" to Mauritius, and, besides feeling grateful to him for his invaluable services, I wished to comply with the desire of Sekelétu, and take him to England, believing that a report of the wisdom and power of Englishmen from his lips would have a beneficial effect on the minds of his countrymen in relation to Christianity. But the excitement of seeing so many new things seemed to prove too much for his brain, and during the night, after seeing the steamer towing us into this harbour, he became quite insane, and drowned himself. He could swim well, but he hauled himself down by the chain cable. I felt unwilling to use restraint, because, being a gentleman in his own country, I feared lest a taint of insanity should remain after our return, and that he might prejudice the minds of his countrymen by representing confinement as an act of cruelty, and my regret for not using constraint is now unavailing.

We lost another headman above Teté by a similar cause. A tribe refused us passage, and made a war-dance close to our bivouackment. As they never dance fully armed and dressed, except when about to attack, and I had no intention to be scared backwards by them, this poor man became mad from excitement, which was probably aggravated by remembrance of former scenes in which he had figured, and ran off by night. We spent three days seeking him, but the country being full of lions we never found a trace of him.

DAVID LIVINGSTONE.

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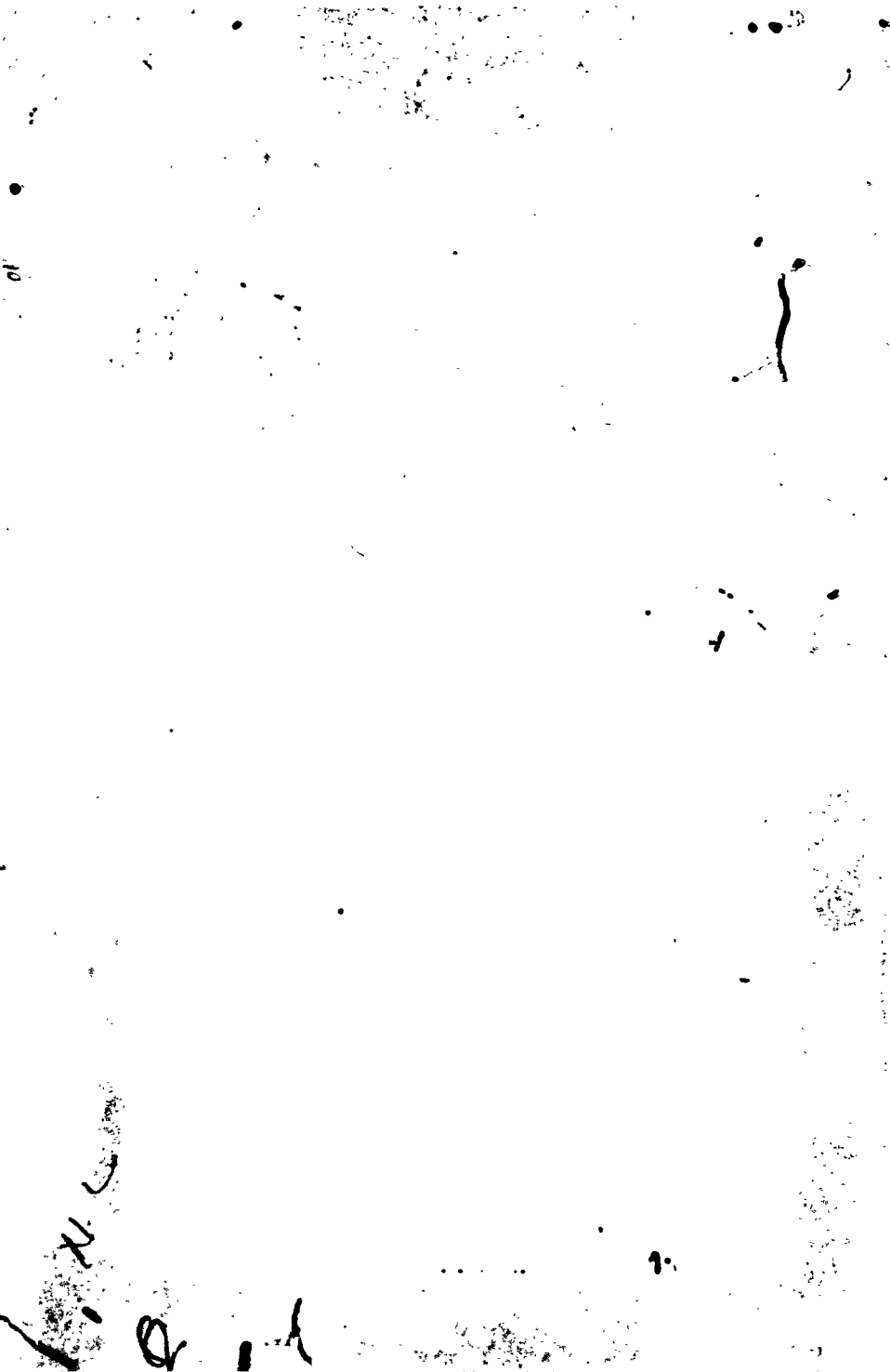
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